MELSEC System Q

Programmable Logic Controllers

User's Manual
(Basic)

Serial Communication Modules
QJ71C24N/-R2/-R4, QJ71C24/-R2
GX Configurator-SC

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Version H

MITSUBISHI ELECTRIC INDUSTRIAL AUTOMATION

• SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the user's manual of the CPU module to use.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Instructions]

⚠ DANGER

- See manuals of each data link for the operating status of each station when there is a communication error in the data link.
  There is the risk of an accident occurring due to output error or malfunctioning.
- When using the notification function, the pager receiver may not be contacted due to the frequency transmission status from the system setup environment and error on the receiver side.
  To ensure the safety of the PLC system, install a call circuit with a lamp display or buzzer sound.
- When performing the control of the PLC in operation (changing data) by connecting a peripheral devices to the CPU module or personal computer, etc. to the intelligent device module, configure an interlock circuit in a sequence program so the safety of the overall system is always maintained.
  Also when performing other controls of the PLC in operation (changing program and operation status (status control)), read this manual carefully and confirm if the overall safety is maintained.
  Especially, when this control is performed to a remote PLC from an external device, troubles that have occurred on the PLC side may not be able to immediately be handled if there is a data communication error.
  Define a troubleshooting agreement between external devices and the PLC CPU for data communication error occurrences, as well as construct an interlock circuit in the sequence program.
- Do not write data into the "system area" of the buffer memory of intelligent function modules.
  Also, do not use any "prohibited to use" signals as an output signal to an intelligent function module from the PLC CPU.
  Writing data into the "system area" or outputting a signal for "prohibited to use" may cause a PLC system malfunction.

[Design Instructions]

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 100mm(3.9inch) or more from each other.
  Not doing so could result in noise that may cause malfunction.
- When using the module while values, such as buffer memory set values, are registered in the Flash ROM, do not turn off the power supply for the module loading station nor reset the PLC CPU.
  If the power supply for the module loading station is turned off or the PLC CPU is reset while any values are registered, the data contents in the Flash ROM become inconsistent and as a result the values must be set again in the buffer memory, etc. and reregistered to the Flash ROM.
  Also, this may cause failure and malfunction of the module.

[Installation Instructions]

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications contained in the user's manual of the CPU module to use.
  Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops. Then, securely mount the module with the fixing hole as a supporting point.
  If the module is not installed properly, it may cause the module to malfunction, fail or fall off.
  Secure the module with screws especially when it is used in an environment where constant vibrations may occur.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not doing so may cause damage to the module.
- Do not directly touch the conductive area or electronic components of the module.
  Doing so may cause malfunction or failure in the module.

[Wiring Instructions]

⚠ CAUTION

- When turning on the power and operating the module after installation and wiring are completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Perform correct pressure-displacement, crimp-contact or soldering for external wire connections using the tools specified by the manufactures.
  Incorrect connection may cause short circuits, fire, or malfunction.
- Attach connectors to the module securely.
- Be sure to fix communication cables or power supply cables leading from the module by placing them in the duct or clamping them.
  Cables not placed in the duct or without clamping may hang or shift, allowing them to be accidentally pulled, which may cause a module malfunction and cable damage.
- Before connecting the cables, check the type o f interface to be connected.
  Connecting or erroneous wiring to the wrong interface may cause failure to the module and external devices.
- Tighten the terminal screws within the range of specified torque.
  If the terminal screws are loose, it may result in short circuits or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- When removing the communication cable or power supply cable from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module.
  When removing the cable connected to the terminal block, first loosen the screws on the part that is connected to the terminal block.
  Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.
- Be careful not to let foreign matters such as sawdust or wire chips get inside the module.
  They may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when wiring.
  Do not remove this film until the wiring is complete.
  Before operating the system, be sure to remove the film to provide adequate heat ventilation.

[Startup/Maintenance Instructions]

⚠ CAUTION
• Do not disassemble or modify each module. Doing so could cause failure, malfunction injury or fire. • Switch all phases of the external power supply off when mounting or removing the module. Not doing so may cause failure or malfunction of the module. • Do not mount/remove the module onto/from base unit more than 50 times (IEC61131-2-compliant), after the first use of the product. Failure to do so may cause the module to malfunction due to poor contact of connector. • Do not touch the connector while the power is on. Doing so may cause malfunction. • Switch all phases of the external power supply off when cleaning or retightening terminal screws and module installing screws. Not doing so may cause failure or malfunction of the module. If the screws are loose, it may cause the module to fallout, short circuits, or malfunction. If the screws are tightened too much, it may cause damages to the screws and/or the module, resulting in the module falling out, short circuits or malfunction. • Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module. Failure to do so may cause a failure or malfunctions of the module.

[Operation Instructions]

⚠ CAUTION
• When performing the control of the PLC in operation (especially changing data, program, and operation status (status control)) by connecting a personal computer, etc. to the intelligent function module, read this manual carefully and confirm if the overall safety is maintained. Failure to perform correct operation s to change data, program, or the status may result in system malfunction, machine damage, or an accident.

[Disposal Instructions]

⚠ CAUTION
• When disposing of this product, treat it as industrial waste.

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INTRODUCTION

Thank you for purchasing the MELSEC-Q series PLC.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q series PLC you have purchased, so as to ensure correct use.
Please forward a copy of this manual to the end user.

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(Related Manual-2) … Q Corresponding MELSEC Communication Protocol Reference Manual

SH-080008-F

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- 1.2 Features of the MELSEC Communication Protocol

2 DATA COMMUNICATION USING THE MELSEC COMMUNICATION PROTOCOL
- 2.1 Types and Applications of Data Communication Frames
- 2.2 Accessible Range of Each Data Communication Frames
- 2.3 How to Read the Control Procedures of the MC Protocol
- 2.4 Access Timing of the PLC CPU Side
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- 2.6 Accessing Other Stations
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- 2.10 Compatibility with Multiple CPU Systems
- 2.11 Compatibility with the Q00CPU, Q01CPU Serial Communication Function

3 WHEN COMMUNICATING USING THE QnA COMPATIBLE 3E/3C/4C FRAMES
- 3.1 Message Formats
- 3.2 List of Commands and Functions for the QnA Compatible 3E/3C/4C Frames
- 3.3 Device Memory Read/Write
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- 3.5 Reading from and Writing to the Buffer Memory of an Intelligent Function Module
- 3.6 PLC CPU Status Control
- 3.7 Drive Memory Defragmentation (for Other Station QnACPU)
- 3.8 File Control
- 3.9 Registering, Deleting and Reading User Frames: for Serial Communication Modules
- 3.10 Global Function: for Serial Communication Modules
- 3.11 Data Transmission to an External device (On-Demand Function): for Serial Communication Modules
- 3.12 Initializing the Transmission Sequence: for Serial Communication Modules
- 3.13 Mode Switching: for Serial Communication Module
- 3.14 Turning Off Displayed LEDs and Initializing Communication Error Information and Error Code: for Serial Communication Module
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- 3.16 Loopback Test
- 3.17 Registering or Canceling PLC CPU Monitoring: for Serial Communication Modules
- 3.18 Remote Password Unlock/Lock

4 WHEN COMMUNICATING USING THE QnA COMPATIBLE 2C FRAMES
- 4.1 Control Procedures and Message Formats
- 4.2 Contents of the Data Designation Items
- 4.3 List of Commands and Functions for QnA Compatible 2C Frames
- 4.4 Precautions on the Data Communication
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5 WHEN COMMUNICATING USING THE A COMPATIBLE 1C FRAMES
- 5.1 Control Procedures and Message Formats
- 5.2 Device Memory Read/Write
- 5.3 Extension File Register Read and Write
- 5.4 Reading and Writing in the Buffer Memory of an Intelligent Function Module
- 5.5 Loopback Test

6 WHEN COMMUNICATING USING THE A COMPATIBLE 1E FRAMES
- 6.1 Message Formats and Control Procedures
- 6.2 List of Commands and Functions for A Compatible 1E Frames
- 6.3 Device Memory Read/Write
- 6.4 Extension File Register Read and Write
- 6.5 Reading and Writing in the Buffer Memory of an Intelligent Function Module

APPENDIX
- Appendix-1 Reading and Writing by Designation of the Device Memory Extension
- Appendix 2 Reading from and Writing to the Buffer Memory
- Appendix-3 Processing Time of the PLC CPU Side While Communicating Using the MC Protocol

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About Manuals

The following table lists the manuals relating to this product. Please order the desired manual(s) as needed.

Related manuals

Manual Name	Manual Number (Model Code)
Q Corresponding Serial Communication Module User's Manual (Application) This manual explains the specifications and operating procedures for the special module functions, the settings for use of special functions, and data-communication method for use with external devices. (sold separately)	SH-080007 (13JL87)
Q Corresponding MELSEC Communication Protocol Reference Manual This manual explains how the external devices read and write PLC CPU data through communication with the MC protocol using the serial communication module/Ethernet module. (sold separately)	SH-080008 (13JF89)
GX Configurator-SC Version 2 Operating Manual (Protocol FB support function) This manual explains the function and usage of the protocol FB support function that supports the creation of the data communication program of the module and set up of each parameter. (sold separately)	SH-080393E (13JU46)

Conformation to the EMC Directive and Low Voltage Instruction

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please see Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) of the CPU module to use.
The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

● How to use this manual

In this manual, details of the serial communication modules (QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24 and QJ71C24-R2) are organized as shown below, according to their applications.
Please use this manual using the contents below as a reference.

(1) To learn about features, functions and component parts

(a) To learn about features and functions
- Chapter 1 describes the features of the serial communication modules.
- Chapter 3 describes the common specifications and functions of the serial communication modules.

(b) To learn about the packed items and system-configured items
- The section prior to Chapter 1, "Product Configuration", describes the parts that are packed along with the serial communication module.
- Parts and components other than those packed with the module must be prepared separately by the user.

(2) To learn about processing required to start up the serial communication module

(a) To learn about the startup procedure
- Section 4.2 describes the general procedures prior to starting the operation of the serial communication module.

(b) To learn about the connection with the external devices
- Section 4.4 describes the connection methods for each type of interface.

(c) To learn about processing required prior to operation of the serial communication module
- Section 4.5 explains the parameter settings with GX Developer in order to use the serial communication module.
- Section 4.6 and Chapter 8 describe the settings from GX Configurator-SC to perform the initial setting of the serial communication module.
  To change an initial value, follow the procedure described in Chapter 8.

(d) To check for failure in the serial communication module
- Section 4.7 describes the test of the individual serial communication module.

(e) To learn how to check for a connection error with the external devices
- Section 4.8 describes how to perform the individual module test and the loopback test using MC protocol-based communication.

✻ Details of the loopback test command are described in the reference manual.

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(3) To learn about data communication functions and detailed explanations

(a) To learn about the communication functions
- Section 3.4 describes an overview of the serial communication module functions.

(b) To learn about detailed explanations of the communication functions
- The basic communication methods are described in Chapters 5 to 7.
- Special functions are described in the User's Manual (Application).

(4) To learn about data communication functions and programming

(a) To learn how to read data from and written to the PLC CPU
- Data is read from and written to the PLC CPU with a communication function using the MC protocol.

＊ Details are described in the Reference Manual.

- Appendix 7 describes an overview of the communication support tool (MX Component) that supports communication using the MC protocol.

(b) To learn how to send and receive data between the PLC CPU and the external devices
- Data communication between the PLC CPU and the external devices is performed with a communication function using the non procedure protocol or the bidirectional protocol.
- Chapter 6 explains details of the communication functions and programming using the non procedure protocol.
- Chapter 7 explains details of the communication functions and programming using the bidirectional protocol.

(5) To learn how to check for error occurrences and take corrective actions

Chapter 10 describes troubleshooting, how to check for errors, and detailed explanations of error codes.

(6) To learn about functions that have been added or changed in function version B

- Section 1.3 lists the functions that have been added or changed as well as manuals that provide detailed explanations hereof.
- Appendix 1.1 provides a breakdown of the functions of Q series C24/GX Configurator-SC by function version/software version.

- The structure of this manual

  The module's buffer memory stores default values that are used as initial settings to execute the data send/receive functions in order to communicate with the external devices.
  Data can be sent to or received from the external devices using these default values. However, it may be necessary to change the default values, depending on system specifications.
  This manual explains how to perform the initial settings in order to use each function of the utility package available for this module (GX-Configurator-SC).
  When changing a default value for sending and receiving data to/from an opposite device, first see the section describing the applicable function to verify the initial setting item and setting value you wish to change, then change the default value as explained in Chapter 8.

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About The Generic Terms and Abbreviations

This manual uses the following generic terms and abbreviations to describe the serial communication modules, unless otherwise specified.

(1) Generic terms and abbreviations of relevant modules

In this manual, the following generic terms and abbreviations are used to indicate the PLC CPU and other modules used for the data-communication functions of the serial communication modules. Module model names are provided when relevant model names are needed to be shown.

Generic term/abbreviation	Description of generic term/abbreviation	
Q series C24 (C24)	Abbreviation for QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24 and QJ71C24-R2 type serial communication modules. (Indicated as "C24" in the diagrams)	
QC24	Generic term for AJ71QC24, AJ71QC24-R2, AJ71QC24-R4, A1SJ71QC24, A1SJ71QC24-R2.	
QC24N	Generic term for AJ71QC24N, AJ71QC24N-R2, AJ71QC24N-R4, A1SJ71QC24N, A1SJ71QC24N-R2.	
QC24(N)	Generic term for QC24, QC24N.	
QCPU	Q mode	Generic term for Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU, Q25PHCPU.
QCPU station	Abbreviation for the PLC with QCPU installed.	
QnACPU	Generic term for Q2ACPU, Q2ACPU-S1, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q3ACPU, Q4ACPU, Q4ARCPU.	
Q/QnACPU	Generic term for QCPU, QnACPU.	
UC24 Computer link module	Generic term for AJ71UC24, A1SJ71UC24-R2, A1SJ71UC24-R4, A1SJ71UC24-PRF, A1SJ71C24-R2, A1SJ71C24-R4, A1SJ71C24-PRF, A2CCPUC24, A2CCPUC24-PRF. ＊ A series computer link modules.	
Serial communication module	Generic term for the module below.	
	QnA series	AJ71QC24, AJ71QC24-R2, AJ71QC24-R4, A1SJ71QC24, A1SJ71QC24-R2, AJ71QC24N, AJ71QC24N-R2, AJ71QC24N-R4, A1SJ71QC24N, A1SJ71QC24N-R2.
	Q series	QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24, QJ71C24-R2

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(2) Other generic terms and abbreviations

This manual uses the following generic terms and abbreviations to explain the data-communication devices for the serial communication module. The names/model names are provided when it is necessary to explicitly identify the model being discussed.

Generic term/abbreviation	Description of generic term/abbreviation
Buffer memory	Generic term for memory of the intelligent function modules/special function modules used for storing data sent to or received from the PLC CPU (setting values, monitor values, etc.)
Computer	Generic term for one of the external devices with which data can be sent/received using the MC protocol or the bidirectional protocol.
Data communication functions	Generic term for MC protocol, non procedure protocol, and bidirectional protocol.
GX Configurator-SC	Abbreviation for GX Configurator-SC (SW0D5C-QSCU-E or later). • Initial settings for the module, monitoring and testing can be performed without using a sequence program and without considering I/O signals or buffer memory. (Intelligent function utility) • Converting sequence programs necessary for data communication processing into FB can shorten program production man-hours. In addition, the monitoring and analysis of the transmitted/received data by the communication network can shorten the system start-up time. (Protocol FB support function)
GX Developer	Abbreviation for GX Developer (SWnD5C-GPPW-E). (n in the model should be 4 or greater)
I/F	Abbreviation for interface
Intelligent function module devices	Generic term for buffer memory of the intelligent function modules used for storing data sent to or received from the PLC CPU (setting values, monitor values, etc.)
Intelligent function modules	Generic term for the Q series PLC modules that are operated by commands from the PLC CPU (equivalent to the A series PLC special function modules). Examples: • CC-Link interface module • A/D and D/A conversion modules • Ethernet interface module • Serial communication module
MELSECNET/10	Abbreviation for MELSECNET/10 network system.
MELSECNET/H	Abbreviation for MELSECNET/H network system.
MX Component	Abbreviation for MX Component (SW0D5C-ACT-E or later).
Operating Manual (Protocol FB support function)	GX Configurator-SC Version 2 Operating Manual (Protocol FB support function)
Opposite devices (external devices)	Generic term for computers, indicators, measuring instruments, ID modules, bar code readers, regulators, other serial communication modules, UC24, etc. that are connected to this serial communication module for data communication.
Reference Manual	Q Corresponding MELSEC Communication Protocol Reference Manual
RS-232 (interface)	Abbreviation for interface conforming to RS-232.
RS-422/485 (interface)	Abbreviation for interface conforming to RS-422 and RS-485.
Special function modules	Generic term for the A/QnA series PLC modules that are operated by commands from the PLC CPU (equivalent to the Q series PLC intelligent function modules). Examples: • CC-Link interface module • A/D and D/A conversion modules • High-speed counter module • Ethernet interface module • Computer link module and serial communication module
Switch setting	Generic term for intelligent function module switch setting
User's Manual (Application) or Application	Q Corresponding Serial Communication Module User's Manual (Application)
User's Manual (Basic) or Basic	Q Corresponding Serial Communication Module User's Manual (Basic)

Definitions and Descriptions of Terminology

The following table lists the definitions and descriptions of terminology used in this manual and related manuals for the Q series serial communication modules.

Terms	Description
A compatible IC frame (Formats 1 to 4)	One of the message formats for the serial communication module for performing communication using the MC protocol and ASCII code data. This is the same message format as when communicating using the protocol for the A series computer link modules. Device memory read/write operations for the QCPU are allowed within the device range of the AnACPU. For details, see Chapter 5 of the Reference Manual.
Bidirectional protocol	A communication procedure for the serial communication modules and one of the data communication functions for communicating any data between the PLC CPU and an opposite device. Details are explained in Chapter 7.
Independent operation	A mode of interface operation to communicate data with external devices using a function specified in each communication protocol setting. Two interfaces of serial communication modules do not interact.
Linked operation	The operation mode of each of the two interfaces for a serial communication module that are connected to external devices and linked to one another in order to send/receive data to/from the external devices. The two interfaces communicate data using the identical data-communication function (MC protocol (identical format) or non procedure protocol) and the identical transmission specifications. (Linked operation using the bidirectional protocol is not allowed.)
MELSEC communication protocol (MC protocol)	A communication procedure for the Q series serial communication modules or the Ethernet interface modules, and a name of communication method for accessing to the PLC CPU from an opposite device. (This is called the MC protocol in this manual.) There are two communication methods; one uses ASCII code data and the other uses binary code data. Details are explained in the Reference Manual.
Message send function (Printer function)	This function registers character data (messages) to be sent to external devices (mainly printers) in the serial communication module as an user frame in advance, and sends the registered data for multiple user frames using the non procedure protocol (sent by an instruction from the PLC CPU).
Multidrop connection	A name of the connection when multiple external devices or other serial communication modules are connected in a 1:n or m:n mode using the serial communication module's RS-422/485 interface.
Non procedure protocol	An user's communication procedure and one of the data communication functions for communicating any data between the PLC CPU and an opposite device. Details are explained in Chapter 6.
QnA compatible 2C frame (Formats 1 to 4)	One of the message formats for the serial communication module for performing communication using the MC protocol and ASCII code data. This is the same message format as the communication frame using the protocol for the QnA series serial communication modules. • QnA compatible 2C frame (Formats 1 to 4): QnA simplified frame (Formats 1 to 4) Details are explained in Chapter 4 of the Reference Manual.
QnA compatible 3C frame (Formats 1 to 4) QnA compatible 4C frame (Formats 1 to 4)	One of the message formats for the serial communication module for performing communication using the MC protocol and ASCII code data. This is the same message format as the communication frame using the protocol for the QnA series serial communication modules. • QnA compatible 3C frame (Formats 1 to 4): QnA frame (Formats 1 to 4) • QnA compatible 4C frame (Formats 1 to 4): QnA extension frame (Formats 1 to 4) Details are explained in Chapter 3 of the Reference Manual.

Terms	Description
QnA compatible 4C frame (Format 5)	One of the message formats for the serial communication module for performing communication using the MC protocol and binary code data. This is the same message format as the communication frame using the protocol for the QnA series serial communication modules. • QnA compatible 4C frame (Format 5): QnA extension frame (Format 5) Details are explained in Chapter 3 of the Reference Manual.
User frame	Data name when the fixed format portion of messages to be sent or received between a serial communication module and an opposite device is registered in the module and used for sending and receiving data with the functions listed below. (The contents of an user frame data should conform to the specifications of the opposite device). The data array of the head and tail sections of a message (transmission control code, C24 station number, sum check, fixed data, etc.) to be sent and received is registered in the serial communication module before use. • MC protocol on-demand function. • Data communication function using the non procedure protocol. Details are explained in Chapter 9 of the User's Manual (Applications).

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Product Configuration

The following lists the product configuration of the Q series serial communication modules.

Model	Item name	Quantity
QJ71C24N or QJ71C24	QJ71C24N serial communication module or QJ71C24 serial communication module	1
	Terminal resistor 330Ω 1/4 W (for RS-422 communication)	2
	Terminal resistor 110Ω 1/2 W (for RS-485 communication)	2
QJ71C24N-R2 or QJ71C24-R2	QJ71C24N-R2 serial communication module or QJ71C24-R2 serial communication module	1
QJ71C24N-R4	QJ71C24N-R4 serial communication module	1
	RS-422/485 plug-in connector socket block	2
	Terminal resistor 330Ω 1/4 W (for RS-422 communication)	4
	Terminal resistor 110Ω 1/2 W (for RS-485 communication)	4
	Plate terminal (for connecting a braided shield cable)	4
SW2D5C-QSCU-E	GX Configurator-SC Version 2 (1-license product) (CD-ROM)	1
SW2D5C-QSCU-EA	GX Configurator-SC Version 2 (Multiple-license product) (CD-ROM)	1

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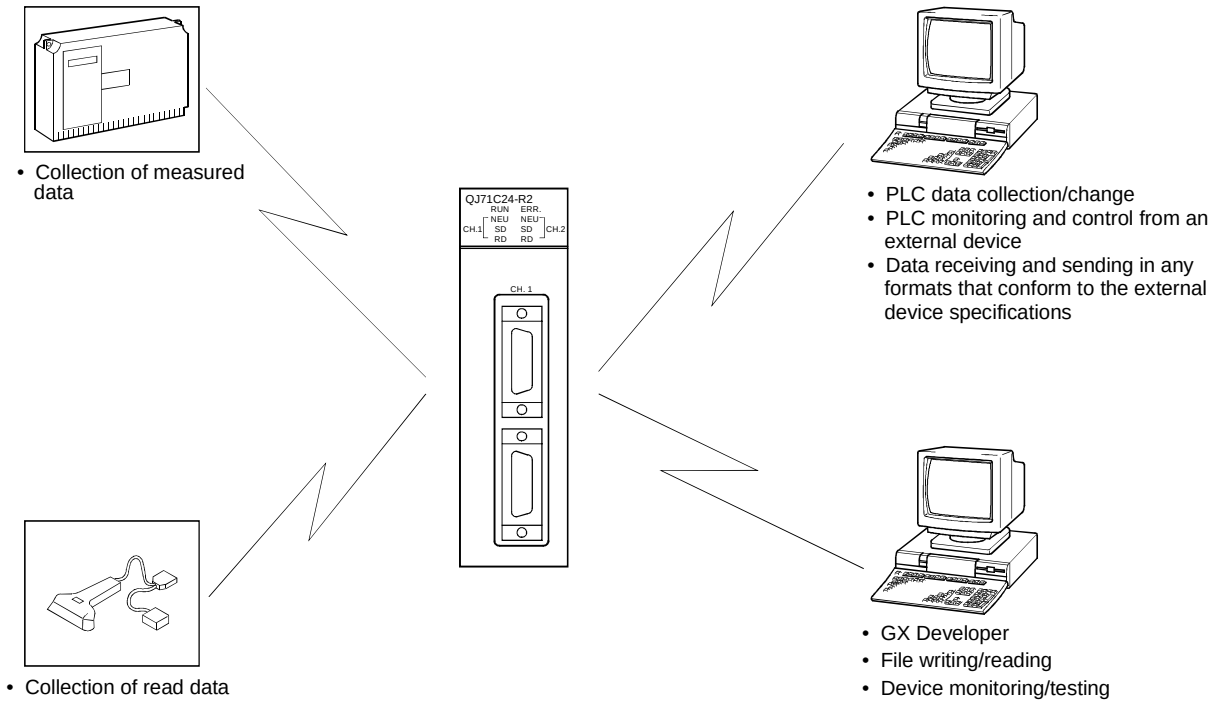
1 OVERVIEW

This manual describes the specifications for the QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24, QJ71C24-R2 serial communication module (hereinafter referred to as "Q series C24"), as well as the procedures prior to starting the operation, maintenance, inspection, data communication methods for use with external devices and troubleshooting.
When applying the following program examples to the actual system, make sure to examine the applicability and confirm that it will not cause system control problems.

1.1 Overview of the Serial Communication Module

The Q series C24 is a module that connects the Q series PLC CPU and an external device using an RS-232 or RS-422/485 line for serial communication, in order to achieve the data communication described below.
By using a modem/terminal adapter, a public line (analog/digital) can be used for data communication with a remote location.

- PLC data collection/change from the external devices
  (See the MELSEC Communication Protocol Reference Manual.)
- PLC monitoring and control from the external devices (See Chapter 2 of the User's Manual (Application).)
- Data receiving and sending in any formats that conform to the external device specifications (See (2) and (3) of Section 1.2.)
- Collection of measured data from a measuring device (See (2) of Section 1.2.)
- Operation of a PLC CPU that is connected to a personal computer (hereinafter abbreviated as PC) installed with GX Developer (SW4D5C-GPPW-E or later, hereinafter abbreviated as GX Developer). (See the GX Developer Manual.)



✻ Being a convenient means of connection among different devices (PCs, display devices, printers, etc.), the serial communication line is the most widely used medium on the market today.

1.2 Features of the Serial Communication Module

The following describes the features of the Q series C24.

(1) Data communication based on the MELSEC communication protocol (hereinafter referred to as the MC protocol)

(Details are explained in the MELSEC Communication Protocol Reference Manual.)

(a) External devices can read/write the PLC device data and sequence programs, and can monitor PLC equipment status.
With the exception of the on-demand function described below, the PLC does not require a sequence program because the PLC sends and receives data based solely on commands from external devices.

(b) Using the on-demand function, data can be sent from the PLC CPU to the external devices in each frame format of the MC protocol.

(c) Data communication can be performed using a program at the external device side that has been created for communicating data with conventional A/QnA series computer link module/serial communication modules.

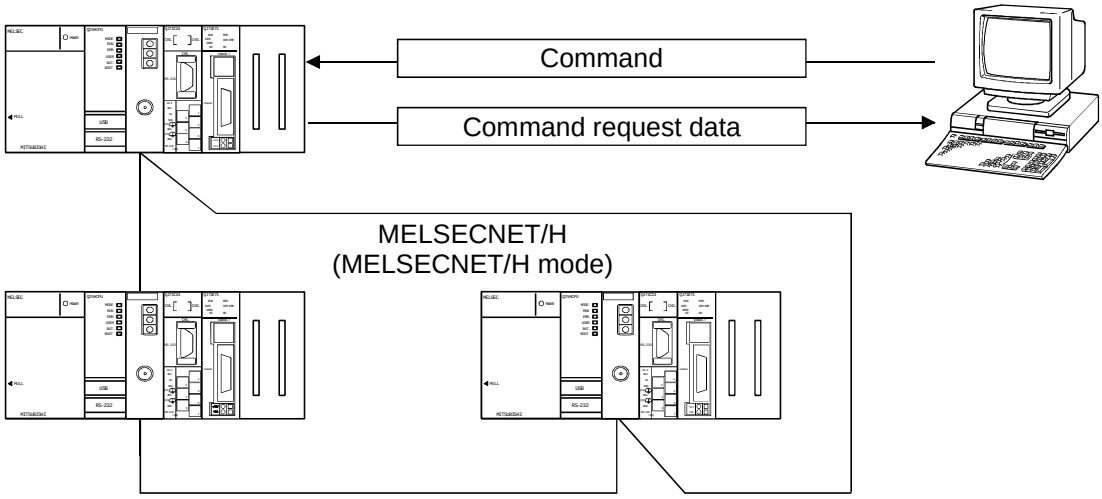
(d) If the external device is a PC running one of the basic operation systems below, it is possible to create a communication program for the external device without considering the detailed MC protocol (transmission/reception procedures) using one of the following separately sold communication support tools.

(Supported basic operation systems)
- Microsoft® Windows® 95 Operating System
- Microsoft® Windows® 98 Operating System
- Microsoft® Windows NT® Workstation Operating System Version 4.0
- Microsoft® Windows® Millennium Edition Operating System
- Microsoft® Windows® 2000 Professional Operating System
- Microsoft® Windows® XP Professional Operating System
- Microsoft® Windows® XP Home Edition Operating System

  ✻ Depending on the version of MX Component used, different operating systems are supported.
  See the manual of MX Component for the details.

(Separately sold communication support tools)
- MX Component (SW0D5C-ACT-E or later, hereinafter abbreviated as MX Component)

  ✻ See Appendix 7 for the overview of MX Component.



* In the MELSECNET/10 mode, other stations (including the A/QnA series PLC CPUs) can be accessed during data link operation.
* The MC protocol is equivalent to the communication function using a dedicated protocol that is supported by the A/QnA series computer link module/serial communication modules.

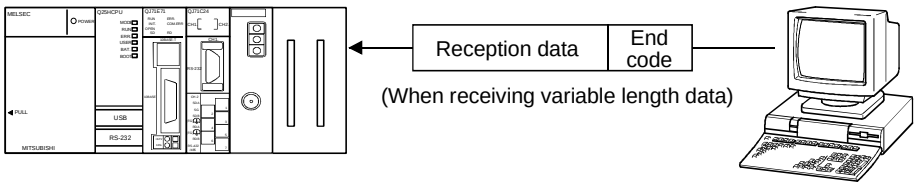
(2) Data communication using the non procedure protocol

(Details are explained in Chapter 6 and the User's Manual (Application).)

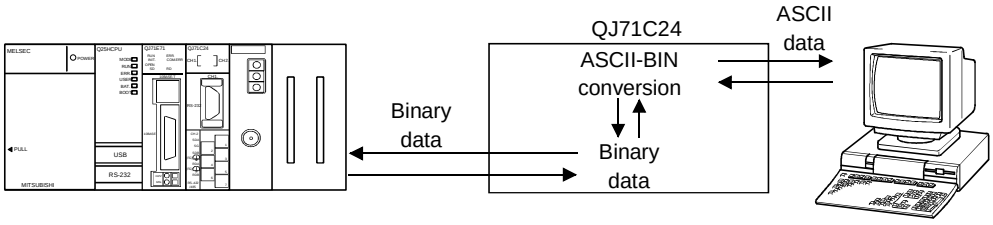
(a) Data can be transferred in any message formats that conform to the specifications of external devices (measuring devices, PCs, etc.).

(b) Fixed or variable length messages can be received in accordance with the external device specifications.

- How to receive the variable length data
  The external device sends data by adding at the end of the message the end-code data (CR+LF or any one-byte data) that is set for the Q series C24.
- How to receive the fixed length data
  The external device sends the amount of data equivalent to the size of the end data that is set for the Q series C24.

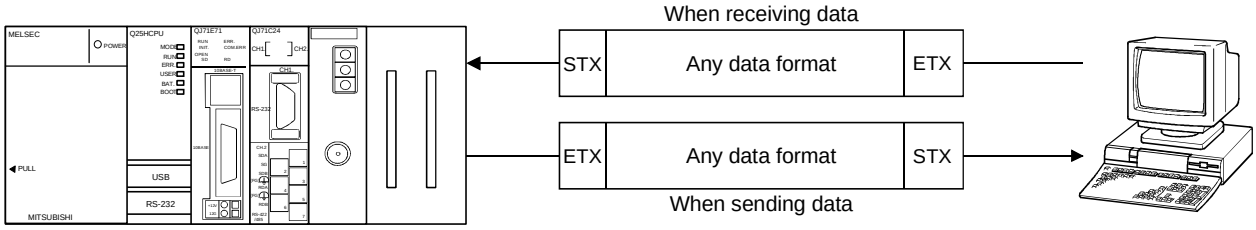


(c) ASCII code data can be used for communication using the ASCII-BIN conversion function.



(d) It is necessary to create a sequence program for communication control that conforms to the external device.

(e) Communication can be performed using an user frame by registering the fixed format portion of the head and tail sections of a message as an user frame.
- When sending data, the Q series C24 adds an user frame to any data specified by the user.
- When receiving data, the Q series C24 transfers any data excluding the user frame to the PLC CPU.



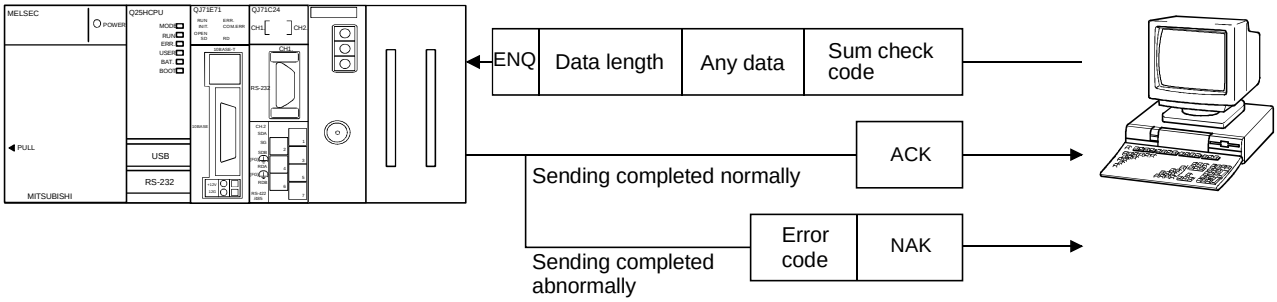
(f) It is possible to clear the current reception data without interrupting the transmission processing by using the dedicated instruction "CSET."

(3) Data communication using the bidirectional protocol

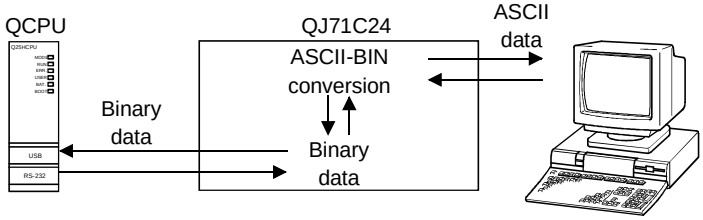
(Details are explained in Chapter 7 and the User's Manual (Application).)

(a) In communication between PLC CPUs and communication with an external device for which transmission/receive control programming is allowed, data communication is performed in a sequence of "data transmission and response receipt".

(b) Error check of received data can be performed using the sum-check code, while the occurrence of a reception error at an external device can be checked via an ACK/NAK response.



(c) ASCII code data can be used for communication using the ASCII-BIN conversion function.



(4) Monitoring the PLC CPU

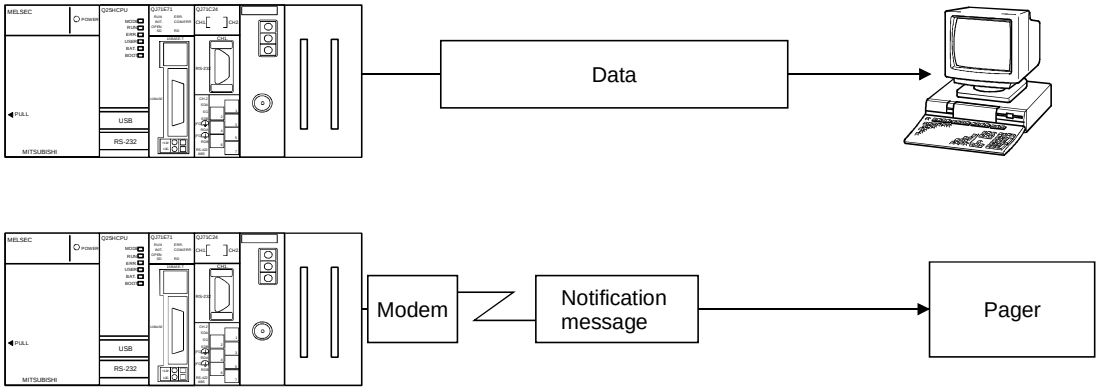
(Details are explained in the User's Manual (Application).)

(a) The self-station's PLC CPU can be monitored at time intervals set by the user without using a sequence program.

1) The following monitoring information can be sent/notified as the result of monitoring the PLC CPU.
   - Transmission of information on devices and the PLC CPU status to be monitored. (It is also possible to send the monitoring information through combined use of the modem function.)
   - Notification of a notification message (string data) registered as the connection data of the modem function, through combined use of the modem function.

2) The user can select either one of the following timing choices at which to send the PLC CPU monitoring result to the external device.
   - Send/notify every time the PLC CPU is monitored (periodic transmission).
   - Send/notify when the information read from the PLC CPU matches the conditions set by the user (conditional transmission).

(b) The PLC CPU monitoring function can be used in communication using the MC or non procedure protocol.



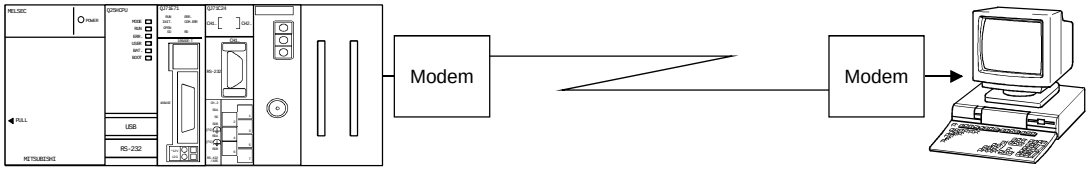
(5) Remote communications using the modem function

(Details are explained in the User's Manual (Application).)

(a) Data communication can be performed with a remotely located external device.

(b) Modem initialization and line connection/disconnection can be performed.

(c) Data communication can be performed using the MC, non procedure or bidirectional protocol.



(6) Initial settings and communication settings without using a sequence program

Various initial settings can be performed using the GX Congifurator-SC (SW0D5C-QSCU-E or later, hereinafter abbreviated as GX Configurator-SC).

(7) Connecting the GX Developer and the GOT

(a) Connecting the GX Developer (Details are explained in the GX Developer Operating Manual.)

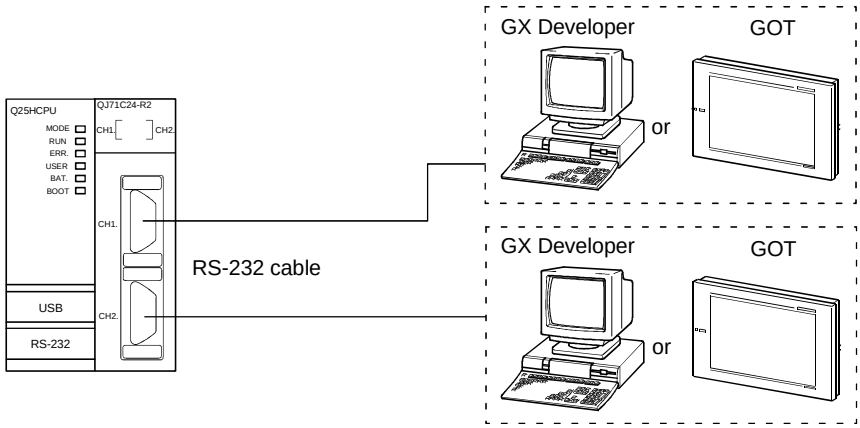
- By connecting a PC installed with a GX Developer to the interface of the Q series C24 at the same time, operations such as programming, monitoring and testing for the PLC CPU can be performed.
- By connecting multiple PCs installed with GX Developers to the PLC CPU or Q-series C24 at the same time, operations such as programming and monitoring can be performed simultaneously by multiple operators. Operating the GX Developers using these simultaneous connections can improve program performance.
- Operations can be performed from a GX Developer by setting the communication protocol of the Q series C24 interface to which a PC is connected to "0" with the switch setting using the GX Developer.

(b) Connecting the GOT (Details are explained in the GOT User's Manual (Connection).)

- By connecting a GOT (graphic operation terminal) to the interface for the Q series C24 operations such as monitoring the PLC CPU can be performed.
- Operations such as monitoring the PLC CPU can be performed by setting the communication protocol of the Q series C24 interface to which a GOT is connected to "0" with the switch setting using a GX Developer.

(c) Simultaneous connection of GX Developer and GOT

- It is possible to connect a PC with GX Developer and the GOT to two interfaces of the Q series C24 at the same time. It is thus possible for more than one user to perform programming, monitoring, etc. simultaneously.
- When the GOT and the PC with GX Developer are connected at the same time, the two interfaces of the Q series C24 cannot perform an interlock operation.



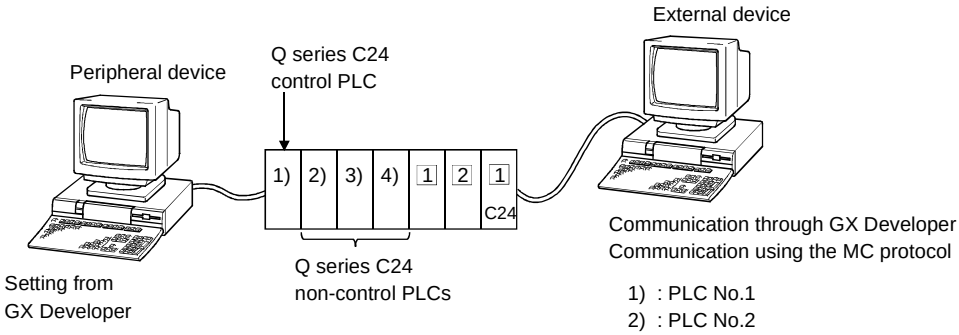
POINT

When GX Developer and/or the GOT is connected directly to the Q series C24, switching settings using GX Developer need not be made to perform access to the QCPU, monitoring and other operations. (They can also be performed when the communication protocol is set to "0" by making switch settings using GX Developer.)

(8) Functions supporting multiple CPU systems (Details are explained in the Reference Manual.)

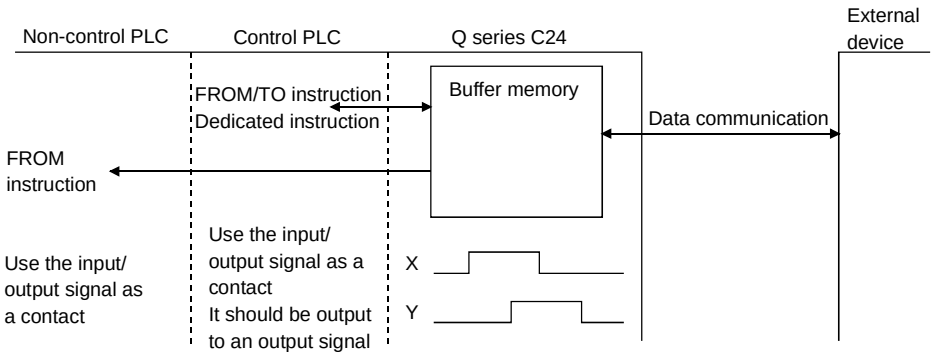
(a) When accessing QCPUs in a multiple CPU system using the MC protocol or through GX Developer, it is possible to perform data communication such as reading/writing device data by specifying the QCPU to be accessed.

- When using the Q series C24 in a multiple CPU system, a QCPU controlling the Q series C24 (hereinafter referred to as the control PLC) should be specified using GX Developer.
  It is also possible to mount a Q series C24 of function version A in a multiple CPU system and access to the only control PLC (PLC No.1).

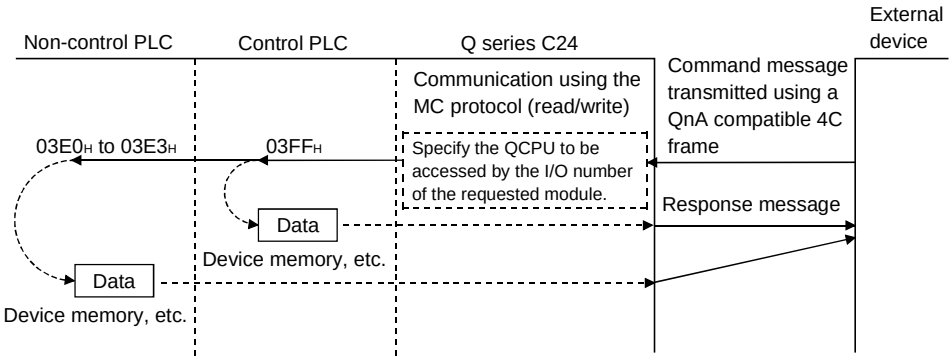


(b) When a Q series C24 CPU of function version B is used in a multiple CPU system, the following forms of data communication can be performed with the Q series C24.

1) It is possible to perform data communication using the non procedure/bidirectional protocols from the control PLC
2) It is possible to read the buffer memory from non-control PLCs. Input/output signals can be used as contacts.

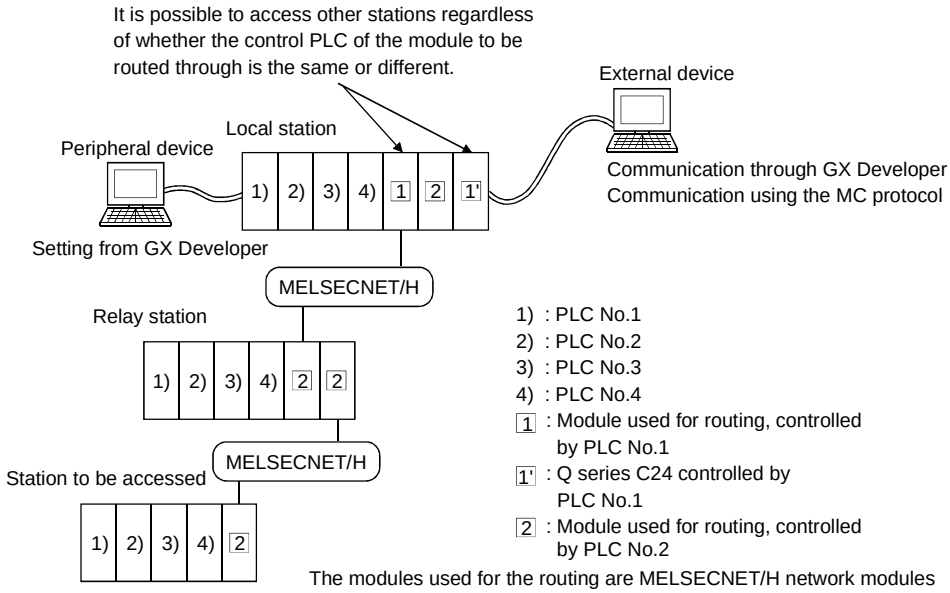


3) It is possible to access the control PLC and non-control PLCs using the MC protocol and through GX Developer from the external device.
In addition, data communication with the control PLC of the Q series C24 can be performed using the non procedure/bidirectional protocol.
(Example) When communicating with the MC protocol



If the MC protocol, GX Developer is used to access other stations, it is possible to access the control PLC and non-control PLCs of the station to be accessed even if the relay station and the accessed station are multiple CPU systems.

(Example)



* The QnA compatible 4C frame should be performed for access to non-control PLCs when communicating using the MC protocol.
However, the available functions differ depending on the QCPU to be accessed (whether it is a control PLC or a non-control PLC).
See the Reference Manual for the available functions and accessible range.

* A module used for routing can access the following modules when accessing other stations:
  - MELSECNET/H, MELSECNET/10 network module
  - Q series C24 • Ethernet interface module

* If there is a module of function version A among the modules for routing, it is possible to access the control PLC of that particular module only. In addition, it is possible to access other stations via a module controlled by the same control PLC.

(9) Remote password check function

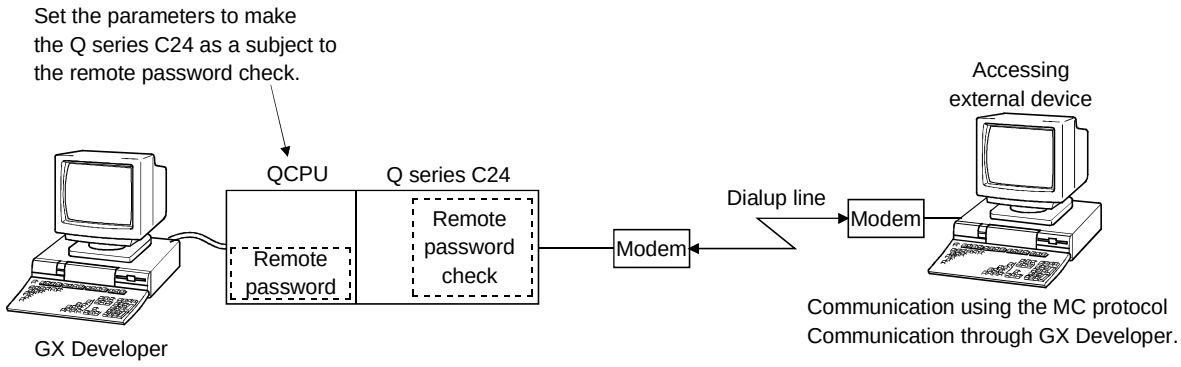
(Details are explained in the User's Manual (Application) and the Reference Manual.)

(a) The remote password check function of the Q series C24 prevents users at a remote location to access QCPUs illegally using the modem function of the Q series C24.
(The remote password is checked in the following forms of data communication)
- Communication using the MC protocol
  (The remote password check is not carried out in data communication using the non procedure/bidirectional protocols.)
- Access to the PLC through GX Developer

＊ The remote password function is one of the QCPU functions and used for preventing illegal access to the QCPU by other users.
Use GX Developer to set a remote password for the QCPU in order to activate the remote password function of the QCPU.

(b) If the Q series C24 is specified in the parameters of a QCPU as being subject to the remote password check, the remote password can be unlocked (canceled) using either one of the methods below, to allow data communication from the external device. It is necessary to connect a line to the modem first.
- When communicating using the MC protocol
  Use the dedicated command for communication using the MC protocol to unlock the remote password from the external device.
- When accessing the PLC through GX Developer
  Unlock the remote password using GX Developer at the start of online operation.

The remote password is automatically locked by disconnecting the line to the modem.



1.3 About Added/Changed Functions in Function Version B

The table below lists the functions that have been added or changed in the Q series C24 of function version B.
See Section 2.6 for the function version, serial NO. and software version of products (CPU module, GX Developer, GX Configurator-SC) related to the Q series C24 which can use added/changed functions.
See Appendix 1.1 concerning a comparison of functions in the different Q series C24 function versions.

Function	QJ71C24N (-R2/R4)	QJ71C24 (-R2)	Outline of function	Reference section
Simultaneous connection of GX Developer and GOT	○	○	This function allows access to the PLC from a PC with GX Developer and a GOT connected to two different interfaces of the Q series C24 at the same time.	Section 1.2 of User's Manual (Basic)
Control of RS and DTR signal states	○	×	This function allows the control of the on or off state of the RS and DTR signals with the PLC program.	Remark of section 3.2.1
Support for 230,400 bps	○	×	This function allows data communication with an external device at a transmission speed of 230,400 bps.	Chapter 4 of User's Manual (Basic)
Data transmission/reception at low speed	○	○	This function allows data communication with an external device at a transmission speed of 50 bps.	
Clearing reception data by a dedicated instruction	○	○	This function allows clearing reception data using the CSET instruction during data communication using the non procedure protocol. It is possible to clear the data even when data is being transmitted.	Chapter 6, Section 9.8 of User's Manual (Basic)
Transmission of the PLC CPU monitoring information through combined use of the modem function	○	○	When the PLC CPU monitoring function is active, this function sends the monitoring information of the PLC CPU to the external device through the modem.	Chapter 2 of User's Manual (Application)
Remote password check	○	○	This function allows data communication after the external device completes the unlock processing of the remote password set at a QCPU. It is executed when the QCPU is accessed from a remote location using the modem function of the Q series C24 in the following forms of data communication: • Communication using the MC protocol • Communication using GX Developer	Chapter 3 of User's Manual (Application) Section 3.18 of Reference Manual
Automatic initialization for modem	○	○	Initializes the modem automatically when Q Series C24 starts up.	Chapter 3 of the User's Manual (Application)
Callback	○	○	After line connection from the GX Developer, access to the QCPU from the GX Developer is made possible through line reconnection from the Q Series C24 (callback). Transmission costs after line connection from the Q Series C24 side are borne by the Q Series C24 side.	
Addition of non reception monitoring time format in non procedure protocol	○	×	This function allows messages to be received in the non reception protocol by time-out in non reception monitoring time (timer 0) if the received complete code and received data count have been not determined.	Chapter 6 of User's Manual (Application)
Transmission control start/end free area designation	○	×	This function allows the designation of the available capacity of the OS area that notifies the data reception failure at the time of transmission control (DTR/DSR signal control and DC code control).	Chapter 7 of User's Manual (Application)
Addition of changeable data to the user frame (05H, 0BH, 11H, 17H)	○	○	These functions allow the following codes to be registered as the changeable data of user frames for data communication. • Horizontal parity code • Sum check code of two's-complement number	Chapter 9 of User's Manual (Application)
Addition of changeable data to the user frame (04H, 0AH, E5H, EBH)	○	×		
Adding a reception function through the use of user frames	○	○	This function allows reception of a message consisting of the head frame and any data field when receiving data by specifying the head frame. The data length of the data field can be specified freely for each combination of user frames for reception set by the user. (Receiving 1 byte providing ACK/NAK only is also possible by setting the data length of the data field to "0.")	Chapter 11 of User's Manual (Application)

Function	QJ71C24N (-R2/R4)	QJ71C24 (-R2)	Outline of function	Reference section
Multiple specification of transparent codes for transmission	○	○	This function allows specification of a maximum of 10 types of transparent codes for transmission per interface when sending data using one of the following protocols: • Non procedure protocol • Bidirectional protocol	Chapter 12 of User's Manual (Application)
Switching to the GX Developer connection mode by switching the mode	○	×	This functions allows the GX Developer connection mode to be switched by an external device or the PLC CPU.	Chapter 15 of User's Manual (Application) Section 3.13 of Reference Manual
Communication data monitoring function	○	×	This function allows the monitoring of communication data transmitted on the communication network of the Q series C24 and an external device.	Chapter 16 of User's Manual (Application) Operating Manual (Protocol FB support function)
UINI instruction	○	×	The UINI instruction allows change of the mode, transmission specifications and host station No. of the Q series C24.	Chapter 17 of User's Manual (Application)
Support for multiple CPU system	○	○	This function allows access to the control/non-control PLCs specified by the user when performing the following forms of data communication with a multiple CPU system: • Communication using the MC protocol • QCPU access from GX Developer	Section 2.10 of Reference Manual

2 SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

This Chapter describes the system configuration and available functions.

2.1 Applicable Systems

The following describes applicable systems.

(1) Applicable modules and number of modules that can be mounted

The following table lists the CPU module and network modules (for remote I/O stations) that the Q series C24 can be mounted and the number of modules which can be mounted.

Applicable module		Number of modules that can be installed	Remarks
CPU module	Q00JCPU	Maximum 8	(*1)
	Q00CPU Q01CPU	Maximum 24	
	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	Maximum 64	Can be installed in Q mode only (*1)
	Q12PHCPU Q25PHCPU	Maximum 64	(*1)
Network module	QJ72LP25-25 QJ71LP25GE QJ72BR15	Maximum 64	MELSECNET/H Remote I/O station (*2)

*1 See User's Manual (Function Explanation, Program Fundamentals) for the CPU module to use.
*2 See Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) The base module to which the Q series C24 can be mounted

The Q series C24 can be mounted into any I/O slot (*1) of the base module.

*1 Limited to within the range of I/O points for the CPU module and network module (for remote I/O station)

(3) Multiple CPU systems

When using the Q series C24 on a multiple CPU system, refer to the QPU User's Manual (Multiple CPU System) before operation.

(a) Applicable Q series C24

If using the Q series C24 on a multiple CPU system, use function version B of the Q series C24.

(b) Intelligent function module parameter

To write the intelligent function module parameter on a PLC, be sure to write it in the Q series C24 control PLC only.

(4) Applicable software packages

(a) Software/setting & monitor tools (*1) for the PLC

The following table lists the systems and software packages applicable for the Q series C24.

When using the Q series C24, GX Developer is required.

		Software packages	
		GX Developer	GX Configurator-SC
Q00J/Q00/Q001CPU	Single CPU system	Version 7 or later	Version 1.0 or later (Versions prior to SW0D5C-QSCU-E 40E are not usable.)
	Multiple CPU system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single CPU system	Version 4 or later	SW0D5C-QSCU-E 00A or later
	Multiple CPU system	Version 6 or later	SW0D5C-QSCU-E 20C or later
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later	Version 1.13P or later (Versions prior to SW0D5C-QSCU-E 40E are not usable.)
	Multiple CPU system		
When installing an MELSECNET/H remote I/O station		Version 6 or later	SW0D5C-QSCU-E 30D or later

*1 See section 2.6 for the versions of the GX Developer and GX Configurator-SC that support the functions added through improvements in the Q series C24.

(b) Communication support tools for external devices

Item Name	Model	Remark
MX Component	SWnD5C-ACT -E	ActiveX control library. The "n" in the model name is 0 or greater. (*1)

*1 Depending on the version of MX Component used, different versions of Q series C24 are supported.
See the manual of MX Component for the details.

2 - 2

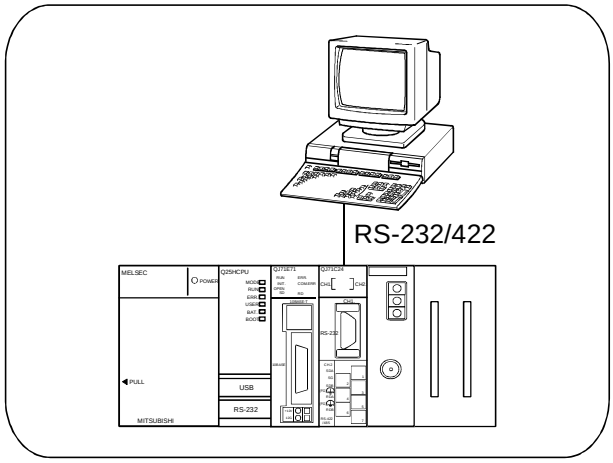
2.2 Combinations of PLC CPU and External Device, and Available Functions

The following describes the system configurations and available functions when using the Q series C24.

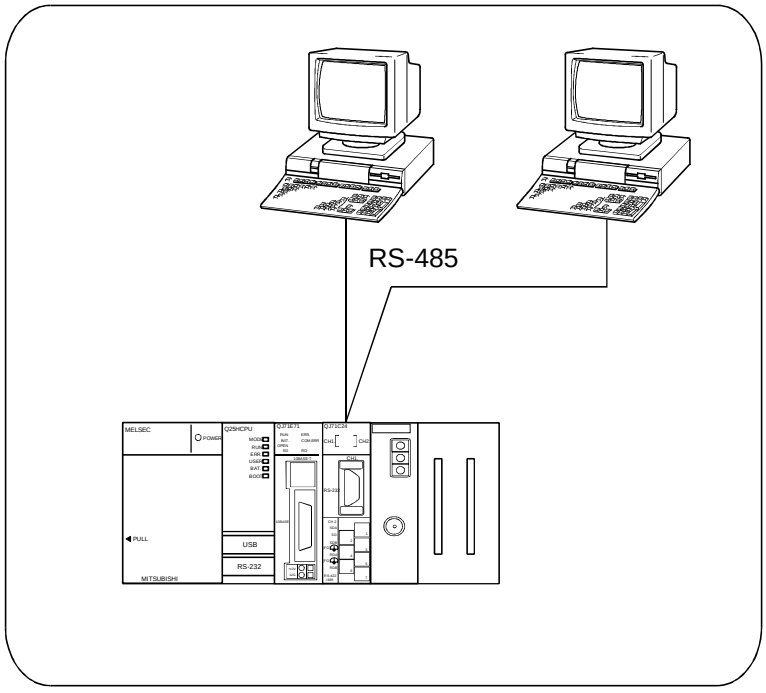
(1) System configurations

System configurations (combinations of PLC CPU and external device) for data communication are shown below.

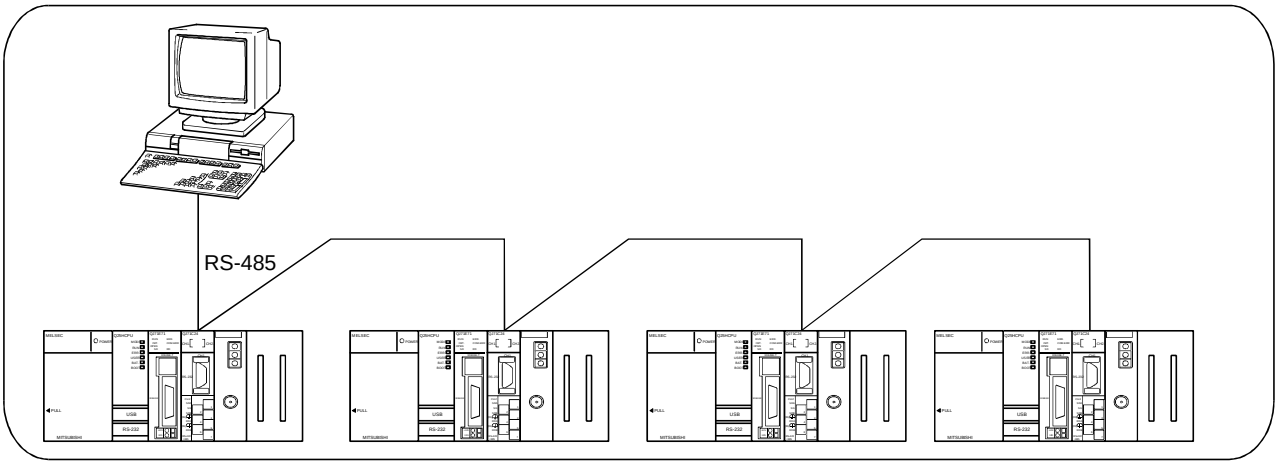
(a) External device and Q series C24 with 1:1 system configuration

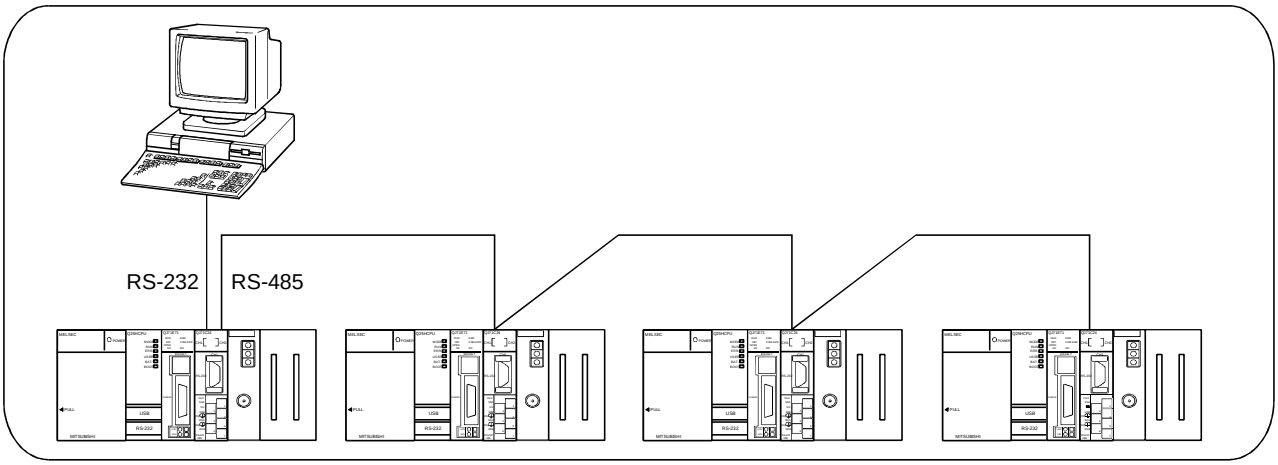


(b) External device and Q series C24 with n:1 system configuration

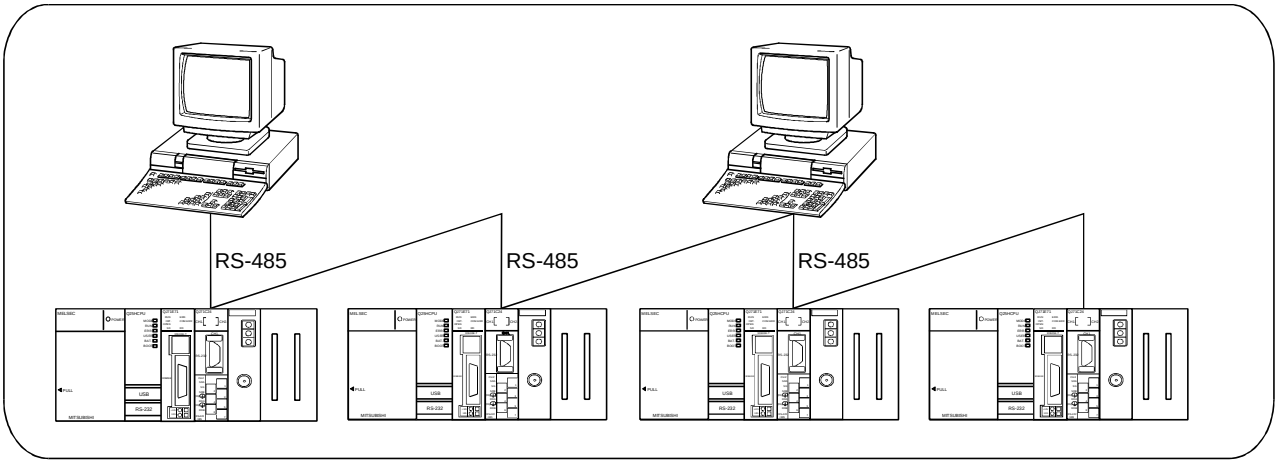


(c) External device and Q series C24 with 1:n system configuration





(d) External device and Q series C24 with m:n system configuration



(2) Correspondence between the data communication functions and system configurations

The following shows system configurations that can use the data communication functions of the Q series C24.

The manual names shown in the reference section column in the table below are as follows:

- Application
  Q Corresponding Serial Communication Module User's Manual (Application)
- Reference
  Q Corresponding MELSEC Communication Protocol Reference Manual

(a) Communication using the MC protocol (○ : Available, × : Not available)

Functions of the Q series C24	System configuration				Reference section	
	1 : 1	n : 1	1 : n	m : n		
PLC CPU device memory read/write	○	○	○	○	Reference	Section 3.3
Intelligent function module buffer memory read/write	○	○	○	○		Section 3.5
Sequence program read/write	○	○	○	○		Section 3.8
PLC CPU status control (remote RUN, STOP, etc.)	○	○	○	○		Section 3.6
On-demand function	○	×	×	×		Section 3.11
					Application	Chapter 10
Global function	○	○	○	○	Reference	Section 3.10
Accessing the PLC of other stations in the MELSECNET/H, MELSECNET/10	○	○	○	○		Section 2.7
PLC CPU monitoring function	○	×	×	×	Application	Chapter 2

(b) Communication using the non procedure protocol

(○ : Available, × : Not available)

Functions of the Q series C24	System configuration				Reference section	
	1 : 1	n : 1	1 : n	m : n		
Data transmission/receiving in arbitrary format	○	○	○	○	This manual	Chapter 6
Data transmission/receiving with user frames	○	○	○	○	Application	Chapter 11
PLC CPU monitoring function	○	×	×	×		Chapter 2
Reading received data using interrupt programs	○	○	○	○		Chapter 4
Sending/receiving ASCII data using ASCII-BIN conversion	○	○	○	○		Chapter 13

(c) Communication using the bidirectional protocol

(○ : Available , × : Not available)

Functions of the Q series C24	System configuration				Reference section	
	1 : 1	n : 1	1 : n	m : n		
Data transmission/receiving	○	×	×	×	This manual	Chapter 7
Reading received data using interrupt programs	○	×	×	×	Application	Chapter 4
Sending/receiving ASCII data using ASCII-BIN conversion	○	×	×	×		Chapter 13

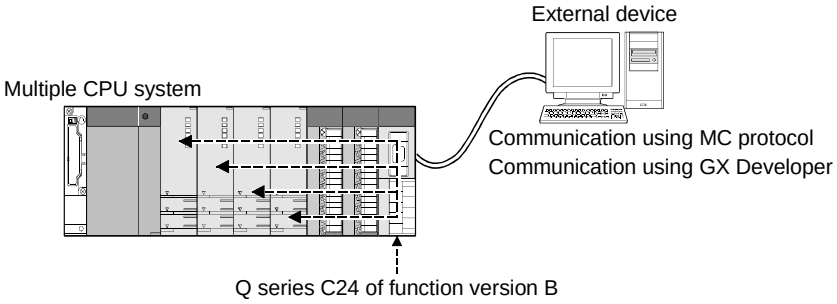
✻ In general, if data communication is performed using a system configuration of other than 1:1 connection mode, the following points should be well noted.

- Avoid simultaneous transmission.
- Discard data received other than that addressed to the local station.

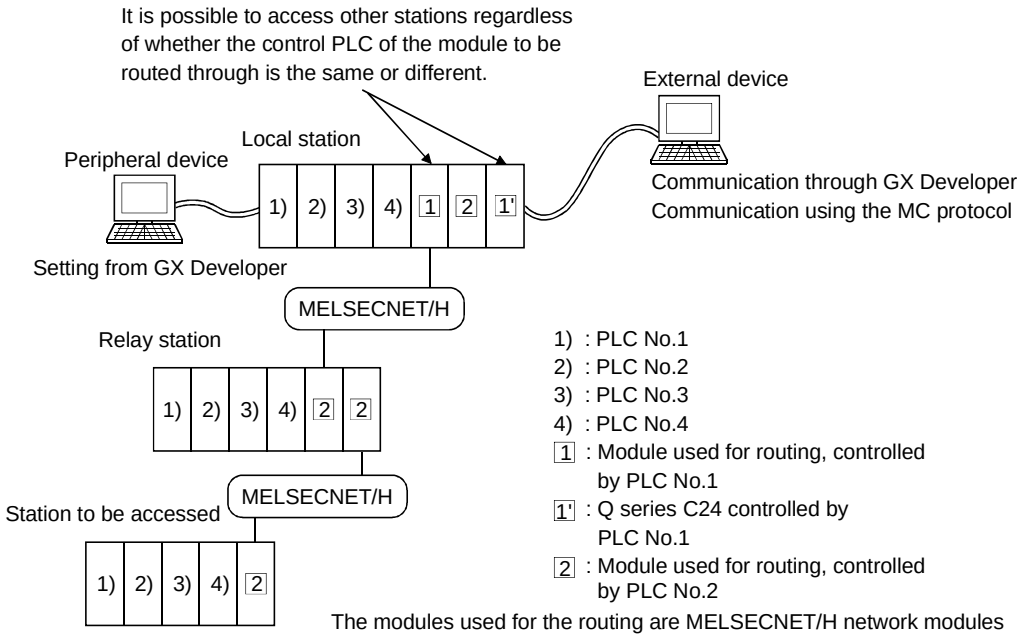
2.3 For Use in Multiple CPU System

This section explains the use of the Q series C24 in a multiple CPU system.

(1) When making access from the external device to the non-control CPU of the Q series C24 using either of the following functions, use the Q series C24 of function version B.
When the Q series C24 of function version A is used, only the control CPU can be accessed. (Access to the non-control CPU will result in an error.)
- Communication using MC protocol
- Communication using GX Developer



(2) If the other stations to be accessed belong to the multiple CPU system, the modules used for routing and QCPUs at the local station, all the relay stations, and the accessed station should be modules of function version B or later. This has to hold in all cases of accessing the non-control PLC of the module used for routing and the accessed station.∗1
(Example)



∗1 When accessing other stations, a module used for routing can access the following modules:
- MELSECNET/H, MELSECNET/10 network modules
- Q series C24
- Ethernet interface modules

2.4 For Use with Q00J/Q00/Q01CPU

This section describes the use of the Q series C24 with the Q00J/Q00/Q01CPU.

(1) Available functions

The following table indicates the functions that can be used when the Q series C24 is mounted in the Q00J/Q00/Q01CPU.

Function		Availability
Communications using the MC protocol (*1)		○
Communications using non procedure protocol		○
	Data reception by interrupt program	○ (*2)
Communications using the bidirectional protocol		○
	Data reception by interrupt program	○ (*2)
Communications using dedicated instructions		○
Communications via public line, etc. (modem function)		○
	Remote password check	○ (*2)
Transmission Control	DC code control (including Xon/Xoff control)	○
	DTR/DSR (ER/DR) control	○
Communications protocol switching		○
Independent/linked operation of each interface		○
Initial setting and monitoring/testing of setting values by the utility package		○
Connecting the GX Developer and GOT		○

○ : Available × : Not available

*1 Communications are according to the MC protocol. See the Reference Manual concerning the number of devices that can be accessed and the processing time.
The range of devices that can be accessed differs depending on the frame used in data communications.

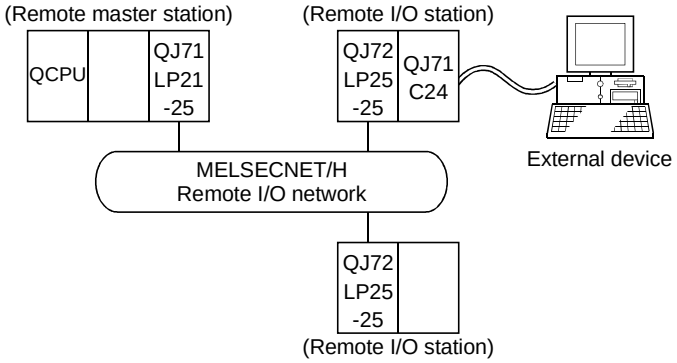
*2 Use Q00J/Q00/Q01CPU (function version B) or later.
When using the function, version 8 or later of the GX Developer is required.

2.5 For Use at MELSECNET/H Remote I/O Station

This section describes the use of the Q series C24 at a MELSECNET/H remote I/O station.
It is not necessary to read this section if the Q series C24 is used with the QCPU.

(1) System configuration

(Example)



(2) Available functions

The following table indicates the functions that can be used when the Q series C24 is mounted on a MELSECNET/H remote I/O station.

Function		Availability
Communications using the MC protocol		○ (*1)
	PLC CPU monitoring (PLC CPU monitoring function)	○ (*2)
Communications using non procedure protocol		○
	Data reception by interrupt program	×
	PLC CPU monitoring (PLC CPU monitoring function)	○ (*2)
Communications using the bidirectional protocol		○
	Data reception by interrupt program	×
Communications using dedicated instructions		× (*3)
Communications via public line, etc. (modem function)		○
	Remote password check	○ (*4)
Transmission Control	DC code control (including Xon/Xoff control)	○
	DTR/DSR (ER/DR) control	○
Communications protocol switching		○
Independent/linked operation of each interface		○
Initial setting and monitoring/testing of setting values by the utility package		○ (See (4))
Connecting the GX Developer		○

○ : Available × : Not available

*1 The following functions are available when communicating with the MELSECNET/H remote I/O station using the MC protocol.

Available function	Function
Device memory read/write	Batch read and batch write
	Random read, test (random write)
	Monitor data registration, monitoring
	Batch read of multiple blocks, batch write of multiple blocks
Buffer memory read/write	Reading/writing from/to the buffer memory of the Q series C24
Reading/writing buffer memory of an intelligent function module	Reading/writing from/to the buffer memory of the specified intelligent function module

The following devices of a MELSECNET/H remote I/O station can be accessed by the device memory read/write function. Note that the accessible devices and the ranges vary depending on the type of frames used for the data communication.
See the Reference Manual for a detailed explanation.

Device name	Device symbol	Device name	Device symbol
Special relay	SM	Link relay	B
Special register	SD	Data register	D
Input relay	X	Link register	W
Output relay	Y	Link special relay	SB
Internal relay	M	Link special register	SW

REMARK

It is only possible to read/write from/to the buffer memory of an intelligent function module for the MELSECNET/10 remote I/O station compatible with the QnA/A series.

*2 PLC CPU monitoring can be registered using the MC protocol or GX Configurator-SC.
The dedicated instruction CSET cannot be used for registration.
The device to be monitored can be registered within the device range of the MELECNET/H remote I/O station.

*3 The dedicated instructions are unavailable for the MELSECNET/H remote I/O station.
For the functions that use the dedicated instructions to make communication, perform programming by the following methods.

Dedicated instruction	Method	Explanation section
FROM, TO	Perform programming using the REMFR/REMTO instruction.	Appendix 9.2
ONDEMAND	Perform programming using the REMFR/REMTO instruction and I/O signal.	Appendix 9.3
INPUT		Appendix 9.4
OUTPUT		Appendix 9.5
BIDIN		Appendix 9.4
BIDOUT		Appendix 9.5
SPBUSY	No method	—
CSET (Receive data clear)	Perform programming using the receive data clear request area of the buffer memory.	Appendix 9.6
BUFRCVS	No method (Data cannot be received using an interrupt program)	—
PRR	Perform programming using the REMFR/REMTO instruction and I/O signal.	Appendix 9.7
CSET (Initial setting)		Appendix 9.8
CSET (PLC CPU monitoring function)	No method (Register/delete the PLC CPU using the MC protocol or GX Configurator-SC.)	—
PUTE	Perform programming using the REMFR/REMTO instruction and I/O signal.	Appendix 9.9 Appendix 9.11
GETE		Appendix 9.10
UINI	Perform programming using the REMFR/REMTO instructions and I/O signals. (However, the station No. cannot be changed.)	Appendix 9.12

*4 Available for the MELSECNET/H remote I/O station of function version D or later.
GX Developer Version 8.18U or later is required to use the function.

(3) Setting from GX Developer

The following parameters should be set through GX Developer in order to use the Q series C24 mounted to a MELECNET/H remote I/O station.
Each of setting is the same way as when setting the parameters for the Q series C24 mounted to a QCPU station: see Section 4.5 and after.
See the operating manual for GX Developer for how to display each setting screen.
(Parameter setting items for the Q series C24 mounted to a MELECNET/H remote I/O station)

Parameter setting item	Setting	Remarks
I/O Assignment	Set the module mounting information	See Section 4.5.1
Switch setting for I/O and intelligent function module	Set the transmission specification and the communication protocol for communication with the external device	See Section 4.5.2
Remote password setting	Perform settings for the remote password.	User's Manual (Application) Section 3.3.3

POINT

(1) Connect GX Developer to a MELECNET/H remote I/O station and set the parameters.
(2) Reset the MELECNET/H remote I/O station after changing the setting.

(4) When monitoring/setting with GX Configurator-SC

(a) About the automatic refresh setting

1) When reading/writing data created by the automatic refresh setting using PLC, the read/write operation should be performed by GX Developer. It cannot be performed from GX Configurator-SC.
2) The devices used for the automatic refresh setting must be of the types M, B, D, or W.

POINT

(1) GX Configurator-SC should be connected to a MELECNET/H remote I/O station before the monitoring/setting.
(2) The MELECNET/H remote I/O station should be reset after changing the setting.

2.6 Checking the Function Version, Serial No., and Software Version

This section explains how to check the the function version, serial No. and software version of related products that can use the functions added by the improvement of the Q series C24.

(1) Correspondence of related products for use additional functions of Q series C24

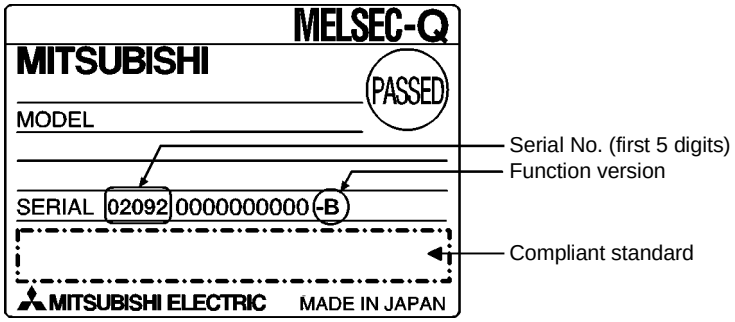
Additional function		Function version of the Q series C24		Version of related product		
		QJ71C24N (-R2/R4)	QJ71C24 (-R2)	CPU module	GX Developer	GX Configurator-SC
Simultaneous connection of GX Developer and GOT		○	Function version B	○	○	○
Transmission specifications	RS and DTR signal status designation	○	×	○	○	Version 2 or later
	Support for 230400 bps					
	Data transmission/ reception at low speed (50 bps)		Function version B			○
Clearing reception data by a dedicated instruction		○	Function version B	○	○	○
Communication via modem function	Transmission of the PLC CPU monitoring information through combined use of the modem function	○	Function version B	○	○	SW0D5C-QSCU-E 20C or later
	Automation initialization of modem		Function version B or later whose first 5 digits of the serial No. are 03043			Version 1.0 or later (Versions prior to SW0D5C-QSCU-E 40E are not usable.)
	Callback				Version 7 or later	
Non procedure and non reception monitoring time format designation		○	×	○	○	Version 2 or later
Transmission control start/end free area designation		○	×	○	○	Version 2 or later
Addition of changeable data to the user frame	05H, 0BH, 11H, 17H	○	Function version B	○	○	SW0D5C-QSCU 20C or later
	04H, 0AH		×			Version 2 or later
	E5H, EBH	Function version B or later whose first 5 digits of the serial No. are 06062	×			Version 2.06G or later
Reception according to user frames (reception according to format 1)		○	Function version B	○	○	SW0D5C-QSCU-E 20C or later
Multiple specification of transparent codes for transmission		○	Function version B	○	○	SW0D5C-QSCU-E 20C or later
Switching the GX Developer connection mode by switching the mode		○	×	○	○	○
Communication data monitoring function		○	×	○	Version 8 or later	Version 2 or later
UINI instruction		Function version B or later whose first 5 digits of the serial No. are 06062	×	○	○	○
Remote password check		○	Function version B	Function version A or later whose first 5 digits of the serial No. are 02092	Version 6 or later	SW0D5C-QSCU-E 20C or later

○ : Usable (no restrictions depending on the version) × : Not usable

(2) Checking the version and serial No. of Q series PLC functions

(a) Using the rated plate on the side of the module to check

The serial No. and function version of the corresponding module is shown in the SERIAL column of the rated plate.



(b) Using the GX Developer to check

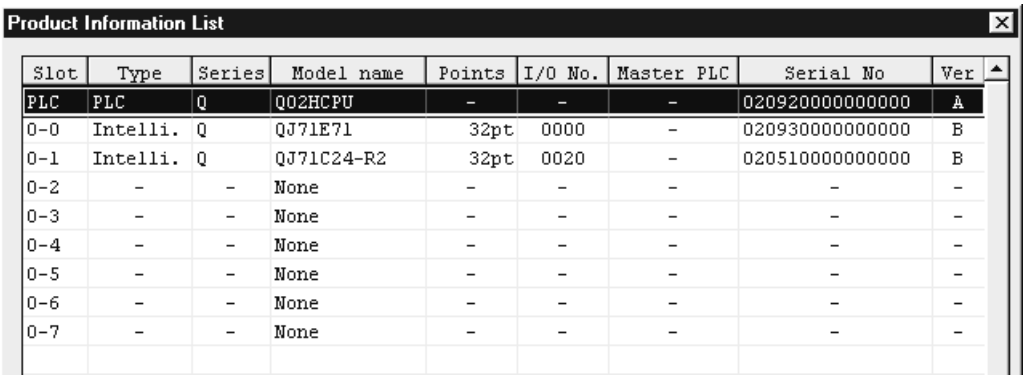
The method of checking the serial No. and function version of the corresponding module with the GX Developer is shown.

The serial No. and function version are displayed on the GX Developer "Product Information List" or "Module's Detailed Information" screen.

The method of checking the serial No. and function version on the "Product Information List" screen is shown below. (See Section 10.1.1 for details about the "Module's Detailed Information" screen.)

[Start Procedure]

"Diagnostics" → "System monitor" → "Product Inf. List"



Slot	Type	Series	Model name	Points	I/O No.	Master PLC	Serial No	Ver
PLC	PLC	Q	Q02HCPU	-	-	-	020920000000000	A
0-0	Intelli.	Q	QJ71E71	32pt	0000	-	020930000000000	B
0-1	Intelli.	Q	QJ71C24-R2	32pt	0020	-	020510000000000	B
0-2	-	-	None	-	-	-	-	-
0-3	-	-	None	-	-	-	-	-
0-4	-	-	None	-	-	-	-	-
0-5	-	-	None	-	-	-	-	-
0-6	-	-	None	-	-	-	-	-
0-7	-	-	None	-	-	-	-	-

[Serial No., Ver.]

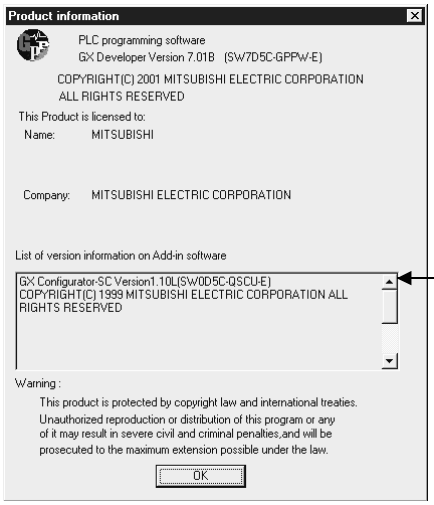
- The corresponding module's serial No. is shown in the Serial No. column.
- The function version of the corresponding module is shown in the Ver. column.

(3) Checking the software version of the GX Configurator-SC

The GX Configurator-SC software version can be checked on the "Product Information List" screen of the GX Developer.

[Start Procedure]

"Help" → Product Information



REMARK

The version indication for the GX Configurator-SC has been changed as shown below from the SW0D5C-QSCU-E 40E upgrade product.

Previous product		Upgrade and subsequent versions
SW0D5C-QSCU-E 40E	→	GX Configurator-SC Version 1.10L

3 SPECIFICATIONS

The following shows the Q series C24 performance specifications.
See the User's Manual of the QCPU (Q mode) for general specifications.

3.1 Performance Specifications

The following shows the Q series C24 performance specifications. For the transmission specifications when communicating via the modem function, see this section and Chapter 3 of User's Manual (Application).

(1) Transmission specification

<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="3">Specifications</th></tr>
<tr><th>QJ71C24N
QJ71C24</th><th>QJ71C24N-R2
QJ71C24-R2</th><th>QJ71C24N-R4</th></tr>
<tr><td rowspan="2">Interface</td><td>CH1</td><td>RS-232-compliance
(D-sub 9 pin)</td><td>RS-232-compliance
(D-sub 9 pin)</td><td>RS-422/485-compliance
(2-piece plug-in connector socket block)</td></tr>
<tr><td>CH2</td><td>RS-422/485-compliance
(2-piece terminal block)</td><td>RS-232-compliance
(D-sub 9 pin)</td><td>RS-422/485-compliance
(2-piece plug-in connector socket block)</td></tr>
<tr><td rowspan="4">Communications system (*1)</td><td>Line</td><td colspan="3">Full-duplex/half-duplex communications</td></tr>
<tr><td>MC protocols communication</td><td colspan="3">Half-duplex communications</td></tr>
<tr><td>Non procedure protocol communication</td><td colspan="3">Full-duplex/full-duplex communications</td></tr>
<tr><td>Bidirectional protocol communication</td><td colspan="3">Full-duplex/full-duplex communications</td></tr>
<tr><td colspan="2">Synchronization method</td><td colspan="3">Start-stop synchronization method</td></tr>
<tr><td colspan="2">Transmission speed</td><td colspan="3">[QJ71C24N(-R2/R4)]
50 / 300 / 600 / 1200 / 2400 / 4800 / 9600
14400 / 19200 / 28800 / 38400 / 57600 / 115200 / 230400 (bps)
• Transmission speed 230400 bps is available for only CH1. (Not available for CH2)
• Total transmission speed of two interfaces is available up to 230400 bps.
• Total transmission speed of two interfaces is available up to 115200 bps when the communication data monitoring function is used.
[QJ71C24(-R2)]
50 / 300 / 600 / 1200 / 2400 / 4800 / 9600
14400 / 19200 / 28800 / 38400 / 57600 / 115200 / - (bps)
• Total transmission speed of two interfaces is available up to 115200 bps.</td></tr>
<tr><td rowspan="4">Data format</td><td>Start bits</td><td colspan="3">1</td></tr>
<tr><td>Data bits</td><td colspan="3">7/8</td></tr>
<tr><td>Parity bits</td><td colspan="3">1 (vertical parity) or none</td></tr>
<tr><td>Stop bits</td><td colspan="3">1/2</td></tr>
<tr><td rowspan="2">Access cycle</td><td>MC protocol communication</td><td colspan="3">Processes one request during installed PLC CPU END processing.
* Number of scans that must be processed/number of link scans depends on the contents of the request. (See Reference Manual.)</td></tr>
<tr><td>Non procedure protocol communication
Bidirectional protocol communication</td><td colspan="3">Sends each time a send request is issued. Can receive at any time.</td></tr>
<tr><td rowspan="2">Error detection</td><td>Parity check</td><td colspan="3">All protocols and when ODD/EVEN is selected by parameter.</td></tr>
<tr><td>Sum check code</td><td colspan="3">MC protocol/bidirectional protocol selected by parameter.
Non procedure protocol selected by user frame.</td></tr>
</table>

(Continued on next page)

(Continued from preceding page)

<table>
<tr><td colspan="3" rowspan="2">Item</td><td colspan="3">Specifications</td></tr>
<tr><td>QJ71C24N
QJ71C24</td><td>QJ71C24N-R2
QJ71C24-R2</td><td>QJ71C24N-R4</td></tr>
<tr><td colspan="3">Transmission control</td><td colspan="3"><table><tr><td></td><td>RS-232</td><td>RS-422/485</td></tr><tr><td>DTR/DSR (ER/DR) control</td><td>Enabled</td><td>Disabled</td></tr><tr><td>RS/CS control</td><td>Enabled</td><td>Disabled</td></tr><tr><td>CD signal control</td><td>Enabled</td><td>Disabled</td></tr><tr><td>DC1/DC3 (Xon/Xoff) control
DC2/DC4 control</td><td>Enabled</td><td>Enabled</td></tr></table>• DTR/DSR signal control and DC code control are selected by the user.</td></tr>
<tr><td rowspan="2">Line configuration (Connection) (＊2)</td><td colspan="2">RS-232</td><td>1:1</td><td>1:1</td><td>—</td></tr>
<tr><td colspan="2">RS-422/485</td><td>1:1, 1:n, n:1, m:n</td><td>—</td><td>1:1, 1:n, n:1, m:n</td></tr>
<tr><td rowspan="6">Line configuration (Data communication) (＊2)</td><td rowspan="3">RS-232</td><td>MC protocols communication</td><td>1:1, 1:n, m:n</td><td>1:1</td><td rowspan="3">—</td></tr>
<tr><td>Non procedure protocol communication</td><td>1:1, 1:n, n:1</td><td>1:1</td></tr>
<tr><td>Bidirectional protocols communication</td><td>1:1</td><td>1:1</td></tr>
<tr><td rowspan="3">RS-422/485</td><td>MC protocols communication</td><td>1:1, 1:n, m:n</td><td rowspan="3">—</td><td>1:1, 1:n, m:n</td></tr>
<tr><td>Non procedure protocol communication</td><td>1:1, 1:n, n:1</td><td>1:1, 1:n, n:1</td></tr>
<tr><td>Bidirectional protocols communication</td><td>1:1</td><td>1:1</td></tr>
<tr><td rowspan="2">Transmission distance (Overall distance)</td><td colspan="2">RS-232</td><td>Maximum 15 m (49.2 ft.)</td><td>Maximum 15 m (49.2 ft.)</td><td>—</td></tr>
<tr><td colspan="2">RS-422/485</td><td>Maximum 1200 m (4592.4 ft.) (overall distance)</td><td>—</td><td>Maximum 1200 m (4592.4 ft.) (overall distance)</td></tr>
<tr><td colspan="3">Flash ROM write count</td><td colspan="3">Maximum 100,000 times to the same area</td></tr>
<tr><td colspan="3">Number of occupied I/O points</td><td colspan="3">32 points per slot (I/O assignment: Intelli: 32 points) (＊3)</td></tr>
<tr><td rowspan="2">Recommended cable</td><td colspan="2">RS-232</td><td colspan="3">7/0. 127 □P HRV-SV Outside diameter 8.5mm (0.33in.) or more
(Oki Electric Cable Co., Ltd. Applicable number is specified in □.)</td></tr>
<tr><td colspan="2">RS-422/485</td><td colspan="3">SPEV (SB)-MPC-0.2 × 3P Outside diameter approx. 6.5mm (0.26 in.) (Mitsubishi Cable Industries, LTD.)
SPEV(SB)-0.2 × 3P Outside diameter approx. 7.5mm (0.3 in.) (Mitsubishi Cable Industries, LTD.) (＊4)</td></tr>
<tr><td colspan="3">Applicable connector for external wiring</td><td colspan="2">D-sub 9 pin (male) screw type (＊5)</td><td>—</td></tr>
<tr><td colspan="3">5V DC internal current consumption</td><td>0.31A</td><td>0.26A</td><td>0.39A</td></tr>
<tr><td colspan="3">External dimensions</td><td colspan="3">98 (3.86 in.) (H) × 27.4 (1.08 in.) (W) × 90 (3.54 in.) (D)[mm]</td></tr>
<tr><td colspan="3">Weight</td><td colspan="3">0.20kg (0.44lb)</td></tr>
</table>

＊1 Set to transfer data with external devices using a full-duplex communication system when the Q series C24 is started. For switching to a half-duplex communication system, refer to the User's Manual (Application).

＊2 Indicates possible combinations when connecting the PLC CPU and external devices (external device side: PLC CPU side). The total number of n and m+n is up to 32 stations.

＊3 In order to use the Q series C24, it is necessary to set the GX Developer switches.
To set the GX Developer switches, refer to section 4.5.

＊4 Recommended cables SPEV (SB)-MPC-0.2 × 3P and SPEV (SB)-0.2 × 3P are equivalent in the electrical characteristics, but partially different in the outside diameter, internal wire colors, etc.

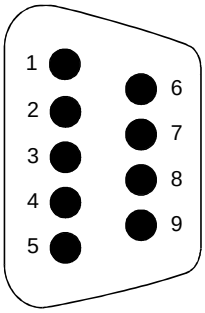
＊5 See Section 3.2.1 (3) for the recommended connector.

3.2 RS-232 Interface Specification

The following shows the RS-232 interface specifications.

3.2.1 RS-232 connector specifications

The following shows the specifications of the RS-232 connector that connects the Q series C24 to an external device.



Pin number	Signal abbreviation	Signal name	Signal direction C24 ⟷ External device
1	CD	Carrier detect	←
2	RD(RXD)	Receive data	←
3	SD(TXD)	Send data	→
4	DTR(ER)	Data terminal ready	→
5	SG	Signal ground	⟷
6	DSR(DR)	Dataset ready	←
7	RS(RTS)	Request to send	→
8	CS(CTS)	Clear to send	←
9	RI(CI)	Call Indicate	←

(1) The control signals are described below. (The pin numbers of the connector are enclosed in parentheses.)

1) CD signal (1)

- The Q series C24 operates according to the setting CD terminal check (see Section 8.4.5) of the Q series C24.

	CD terminal check enabled	CD terminal check disabled
Full-duplex communication	• The Q series C24 performs send and receive processing when the CD signal (receive carrier detection) is ON. • If the CD signal is turned off during data communication, the Q series C24 initializes the transmission sequence.	• The Q series C24 performs send and receive processing regardless of the ON/OFF status of the CD signal. • Data communications is possible with an external device that cannot turn the CD signal ON/OFF.
Half-duplex communication	See Chapter 8 of User's Manual (Application)	Setting impossible.

2) RD signal
This is a signal to receive data.

3) SD signal
This is a signal to send data.

3 - 3

4) DTR signal (4)
- When communicating data using the non procedure protocol, the Q series C24 turns on or off (on when data is receivable) depending on the amount of unused memory in the OS area allocated for receive data storage, if DTR/DSR control is being performed.
  Read the receive data from the sequence program, as the receive data is stored in the OS area when the DTR signal is OFF.
  If DTR/DSR control is not implements, the DTR signal is always ON.
- If an MC protocol or bidirectional protocol is performing data communication, the Q series C24 turns ON when communications is enabled.

5) DSR signal (6)
- During DTR/DSR control, if this signal is OFF, the Q series C24 does not send data to the external device.
  Be sure that this signal is always turned ON when the external device is ready to receive.
- If DTR/DSR control is not implemented, the DSR signal status is ignored.

6) RS signal (7)
- The Q series C24 turns ON/OFF the RS signal as shown below.
- When the communication system is full-duplex communications, if the Q series C24 ready signal (X1E) is ON, the Q series C24 turns ON the RS signal.
- When the communication system is half-duplex communications, when the Q series C24 sends data to an external device, it turns ON the RS signal.
- The RS signal is not turned OFF even when the receive data cannot be stored in the Q series C24.

7) CS signal (8)
- The Q series C24 does not send data to an external device when this signal is OFF.
- Be sure that this signal is always turned ON when the external device is ready to receive.

8) RI signal (9)
- The RI signal is used when the modem status is monitored on the Q series C24 side. It should be connected as needed. The RI signal is not needed to be connected when the modem is not connected.

(2) The ON and OFF states of each signal indicate the following conditions:

	(Output side)	(Input side)
ON	····· 5 V DC to 15 V DC,	3 V DC to 15 V DC
OFF	····· –5 V DC to –15 V DC,	–3 V DC to –15 V DC

(3) Interface connector
The Q series C24 uses the following type of RS-232 interface connector.
9-pin D sub (female) screw fixing type
Use one of the following as a connector shell for the connection cable of the Q series C24 side.
- 3M
  Plug model: 8209-6009 Shell model: 3702-2209 M2.6
- Tyco Electronics AMP K.K.
  Plug model: 747904-2 Shell model: 747515 or 174469-2

REMARK

(1) Confirmation of RS-232 control signal status

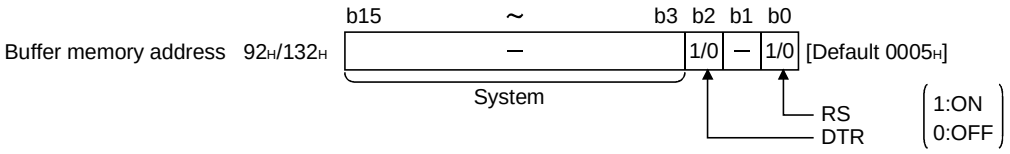
The control signal status of DTR, DSR, RS, and CD can be confirmed during data communication by the RS-232 control signal status storage area (address 254H, 264H) of the GX Configurator-SC or Q series C24 buffer memory.

Bit position	Buffer memory address	
	CH1 side	CH2 side
	254H	264H
b0	RS	
b1	DSR	
b2	DTR	
b3	CD	
b4	CS ＊1	
b5	RI	
b6 to b15	—	

＊1 System area for QJ71C24 (-R2)

(2) Designation of RS and DTR signal status

When the Q series it turned on or off, the on and off states of the RS and DTR signals can be designated when the buffer memory of the RS and DTR signal status designation area (address: 92H, 132H) for the corresponding bit is turned on or off by the RS signal or DTR signal. ＊1 ＊2 ＊3



＊1 The RS signal is controlled by the Q series C24 in the following cases. (Ignore setting contents.)

- When data is communicated with half-duplex communication
- When communication time and the RS and CS signals are controlled by the modem function

＊2 The DTR signal is controlled by the Q series C24 in the following cases. (Ignore setting contents.)

- When the DTR and DSR signals are controlled
- When data is communicated by the modem function

＊3 After writing in the buffer memory, a lag of 0 to 20 ms occurs until it is reflected in the signal.

POINT

Be sure to control the RS and DTR signals with the Q series C24. Control of the RS and DTR signals by the user is a prime factor for data communication errors.

3.2.2 RS-232 cable specification

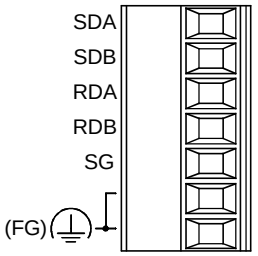
- Use a 15 m (49.21 ft.), or shorter, cable conforming to the RS-232 standard as the RS-232 cable.
  (Recommended cable)
  7/0. 127 □P HRV-SV…□: Designates the number of pairs. (For 13 pairs 7/0.127 13P HRV-SV)
  (Oki Electric Cable Co., Ltd)

3.3 RS-422/485 Interface Specifications

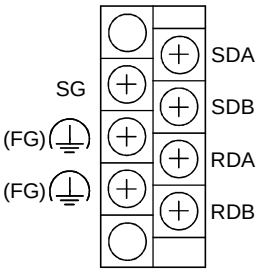
The following shows the RS-422/485 interface specification.

3.3.1 RS-422/485 terminal block specifications

The following shows the specifications of the RS-422 connector and RS-422/485 terminal block that connect to an external device.



QJ71C24N-R4



QJ71C24N
QJ71C24

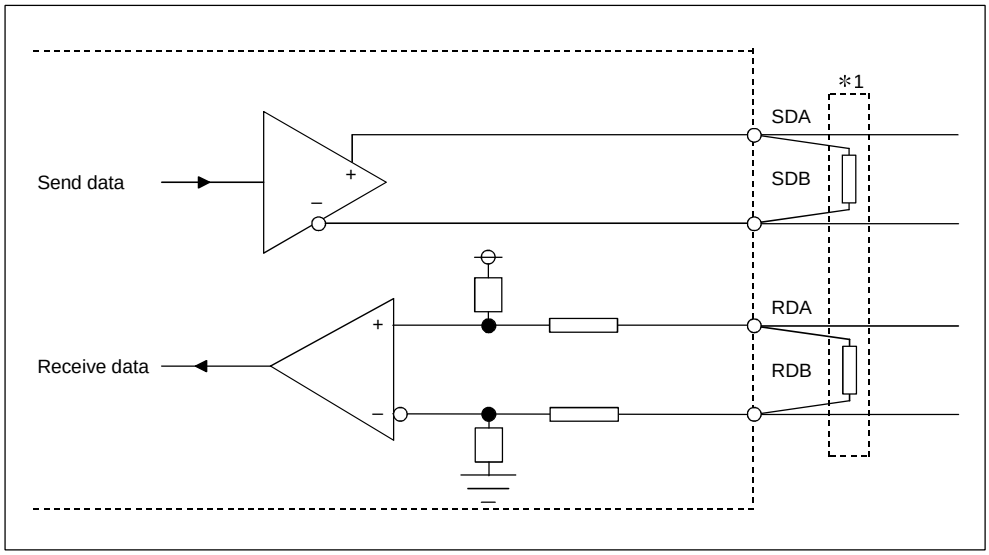
Signal abbreviation	Signal name	Signal direction C24 ⟷ External device
SDA	Send data (+)	→
SDB	Send data (–)	→
RDA	Receive data (+)	←
RDB	Receive data (–)	←
SG	Signal ground	⟷
FG	Frame ground	⟷
FG	Frame ground	⟷

(1) The following describes the control signals.

1) SDA, SDB signals
These are signals to send data from the Q series C24 to the external device.

2) RDA, RDB signals
These are signals for the Q series C24 to receive data from the external device.

(2) The following shows the function block diagrams.
(RS-422/485 interface)



*1 The following shows the terminal resistor connection.
Connect the terminal resistor according to Section 4.4.2 or the User's Manual (Hardware) of the Q series C24 used.

3.3.2 RS-422/485 cable specifications

The following shows the RS-422/485 cable specification.

(1) Use a 1200 m (3937 ft.), or shorter, cable that satisfies the following specification for the RS-422/485 cable (cable to connect the Q series C24 terminal block).

(2) Make the total distance within 1200 m (3937 ft.) when two or more device are connected in a 1:n or m:n configuration.

(3) The RS-422/485 cable specification is shown below.

Item	Description
Cable type	Shielded cable
Number of pairs	3P
Conductor resistance (20 C°)	88.0 Ω /km or less
Insulation resistance	10000 M Ω - km or more
Dielectric strength	500 V DC, 1 minute
Electrostatic capacitance (1 kHz)	60nF/km or less on average
Characteristic impedance (100 kHz)	110 ± 10 Ω

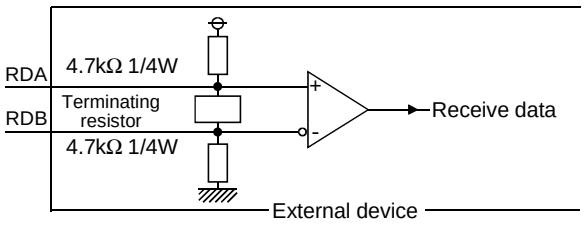
(Recommended cable)
SPEV (SB)-MPC-0.2 × 3P ····· (MITSUBISHI CABLE INDUSTRIES, Ltd.)
SPEV (SB)-0.2 × 3P ····· (MITSUBISHI CABLE INDUSTRIES, Ltd.)
* SPEV (SB)-MPC-0.2 × 3P and SPEV (SB)-0.2 × 3P have the same electrical characteristics, but different external diameter and internal wire colors.

3.3.3 Precautions when transferring data using RS-422/485 circuit

The following precautions must be observed when transferring data with an external device through the Q series C24 RS-422/485 interface.
Take the following into account when the transferring data with the external device.

(1) Error receive data countermeasures at external device during RS-422/485 connection

If the external device may receive erroneous data, install a pull-up or pull-down resistor to the external device as follows.
Installing a pull-up or pull-down resistor (resistance value criteria: approx. 4.7 kΩ 1/4 W) can prevent the reception of erroneous data.



POINT

When there is a pull-up or pull-down resistor at the external device, erroneous data is not received.

REMARK

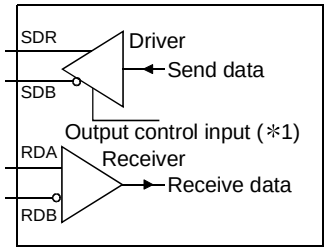
The following describes the case when a pull-up or pull-down resistor is not installed to the external device.
When no station is sending, the send line becomes high impedance and noise, etc. may cause the send line to change and the external device to receive erroneous data.
In this case, there is probably a parity error or framing error.
Therefore, skip the erroneous data.
Since the first data during data reception is fixed in the following cases, also skip the receive data until the fixed head data is received.

- When using an MC protocol to send data, the first data is fixed according to the frame and format the user uses.
- When transferring data using user frames with non procedure protocol or bidirectional protocol, the first data is selected according to the user frame that the user registers to the Q series C24.

(2) RS-422/485 interface operation

1) RS-422-485 interface construction

The following illustration shows the construction of the Q series C24 RS-422/485 interface driver (send)/receiver (receive).



*1 "Output control input" (also called send gate) of the driver (send) section of the illustration at the left determines whether or not data from SDA/SDB is output to the outside.

2) RS-422/485 interface operation

When the "Output control input" in the illustration above is ON, the interface enters the low impedance state (state in which data can be sent).
When the "Output control input" is OFF, the interface enters the high impedance state (state in which data cannot be sent).

3) Timing to start sending and to complete the transmission processing for the Q series C24

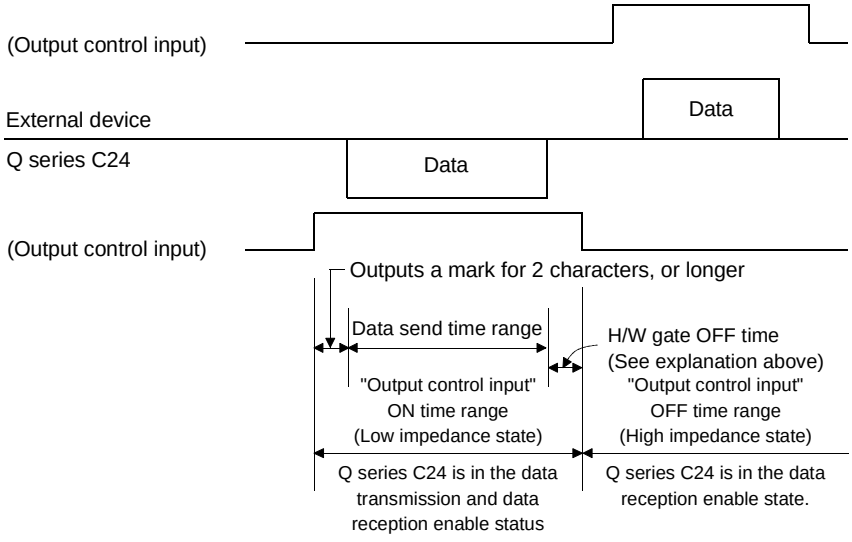
- Timing to start sending

  During data transmission, the Q series C24 outputs the actual data after sending a mark for 2 characters, or longer, after the high impedance set by the operations described in 1) and 2) above is reset.

- Transmission processing completion timing

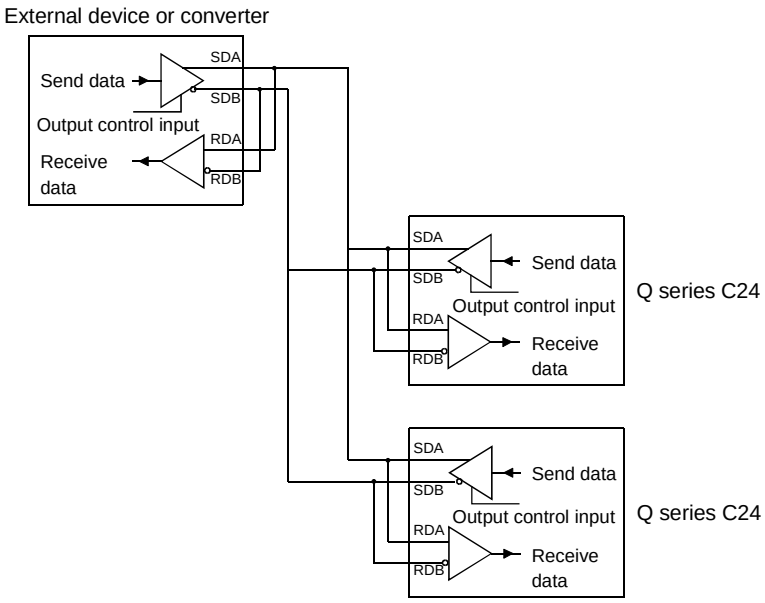
  The following times are necessary as H/W gate OFF time from the time that data transmission is completed until transmission processing is completed (the state changes to the high impedance state). (The transmission rate set in the Q Series C24 is the object.)

  When the transmission rate
  is 600 bps or higher : Time for 0 to 1 bits of data to be sent
  When the transmission rate
  is 50 bps, 300 bps : several ms



POINT

(1) When the external device and the Q series C24 connected in n:1 and m:n configurations
When the send signal of each device is connected as shown below, if the "Output control input" is turned ON at two or more devices, the relevant devices output (send) data at the same time.
For the external device to transfer data normally,
- "Output control input" must be turned ON only when sending data.
- "Output control input" must be turned OFF when not sending data.



(2) When the Q series C24 is used, if operation of the two interfaces is linked (see Section 4.5.2 (2)), the time to send one character becomes the Q series C24 H/W gate OFF time.
(The Q series C24 turns OFF the gate after the one-character send time.)

3.4 Serial Communication Module Function List

The following table lists the functions of the Q series C24.

Function				Reference section
Communication using MC protocol (*1)	Communication with ASCII code	Communication with QnA compatible 3C frame	Formats 1 to 4 exist for each.	Chapter 5 Reference Manual
		Communication with QnA compatible 4C frame		
		Communication with QnA compatible 2C frame		
		Communication with A compatible 1C frame		
	Communication with binary code	Communication with QnA compatible 4C frame	Format 5	
	Read/write of device memory	Batch read/write in bit/word units		
		Monitoring of device memory		
		Batch read/write of multiple blocks		
		Read/write by extension designation		
		Accessing other stations via network system		
	Reading/writing from/to the buffer memory of the Q series C24			
	Reading/writing from/to the buffer memory of intelligent function modules			
	Reading/writing from/to sequence program files			
	Monitoring the PLC CPUs (PLC CPU monitoring function)			
	Status control of the PLC CPUs (remote RUN/STOP, etc.)			
	Turning on/off input signals of the Q series C24 from an external device (global function)			
	Data transmission from a PLC CPU to an external device (on-demand function)			
Communication using non procedure protocol (*2)	Data transmission/reception in any format			Chapter 6
	Data transmission/reception using user frames			User's Manual (Application)
	Data reception by interrupt programs			
	Monitoring the PLC CPUs (PLC CPU monitoring function)			
	ASCII data transmission/reception by ASCII-BIN conversion			
	Data transmission/reception by specifying transparent code			
Communication using bidirectional protocol (*1)	Data transmission/reception in any format			Chapter 7
	Data reception by interrupt programs			User's Manual (Application)
	ASCII data transmission/reception by ASCII-BIN conversion			
	Data transmission/reception by specifying transparent code			
Communication via public network, etc. (modem function)	Communication with MC Protocol/non procedure protocol/bidirectional protocol			
	PLC access from GX Developer			
Transmission control	DC code control (including Xon/Xoff control)			
	DTR/DSR (ER/DR) control			
Independent/linked operation of each interface				Section 4.5.2
Monitoring/testing of initial settings and setting values with utility software				Chapter 8
Supporting multiple CPU system				Section 2.10 of Reference Manual
Remote password check				Section 3.3.3 of User's Manual (Application)

*1 If the external device is capable of incorporating a program and communicating data using a protocol of the MELSEC PLC, it is possible to access the PLC CPU using the above mentioned MC protocol. Furthermore, it is possible to transfer any data using the bidirectional protocol.

*2 When it is necessary to communicate using the protocol of an external device, such as a measuring instrument or a bar code reader, the above-mentioned non procedure protocol is used for data communication. In that case, the processing of the communication data becomes easier by using the user frame communication function.

3.5 Dedicated Instruction List

The following table lists dedicated instructions that can be used in the Q series C24.

○ : Available × : Not available

Classification	Instruction	Description		Protocol			Reference section
				MC	Non	Bi	
For data communication	ONDEMAND	Sends data with the on-demand function		○	×	×	Chapter 9
	OUTPUT	Sends designated number of data		×	○	×	
	INPUT	Receives data (reads received data)		×	○	×	
	BIDOUT	Sends data		×	×	○	
	BIDIN	Receives data (reads received data)		×	×	○	
	SPBUSY	Reads the status of data sent/received with each dedicated instruction		○	○	○	
	CSET	Allows clearing data received up to the present without interrupting the data transmission processing.		×	○	×	
	BUFRCVS	Receives data with an interrupt program (reads received data)		×	○	○	Chapter 17 of User's Manual (Application)
	PRR	Sends data with user frames using transmission schedule table		×	○	×	
Setting value registration/ reading	PUTE	Stores user frames in flash ROM of the Q series C24 (writing)		○	○	○	
	GETE	Reads user frames stored in flash ROM of the Q series C24		○	○	○	
PLC CPU monitoring instructions	CSET	Performs PLC CPU monitoring registration	For PLC CPU monitoring function	○	○	×	
		Cancels PLC CPU monitoring					
Initial value setting instruction		Sets the unit for the number of communication data (words/bytes) and the data communication area				○	
Mode switching instruction	UINI	Changes the mode, transmission specifications and host station No. of the Q series C24.		○	○	○	

* Abbreviations used in the Protocol column
MC : MC protocol
Non : Non procedure protocol
Bi : Bidirectional protocol

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3.6 Utility Package (GX Configurator-SC) Function List

The following table lists the utility package function for the Q series C24.

(○ : Protocol for which setting is valid)

Function			MC	Non-procedure protocol	Bidirectional protocol	Explanation page	Remarks
Auto refresh setting		Refresh the Q series C24's error codes and set devices on the PLC CPU side.	○	○	○	Section 4.6	
User frame		Register the user frame in the flash ROM.	○	○	—	Section 8.4.1	
Data for modem initialization		Register the data for modem initialization in the flash ROM.	○	○	○	Section 8.4.2	
Data for modem connection		Register the data for model connection in the flash ROM.	○	○	○	Section 8.4.3	
Modem function system setting		Register the system setting values for model function in the flash ROM.	○	○	○	Section 8.4.4	
System setting	CHn Transmission control and others system setting	Set the transmission specifications with the other device. (DTR/DSR control, DC code control, communication method, data communication monitoring timer value, etc.)	○	○	○	Section 8.4.5	Can be used via online operation. Can be used via offline operation.
	CHn MC protocol system setting	Assign the buffer memory for on-demand function, set the user frame number, etc.	○	—	—	Section 8.4.6	
	CHn Non procedure system setting	Assign the buffer memory needed to perform data communication using the non procedure protocol, and change the setting values, etc.	—	○	—	Section 8.4.7	
	CHn Bidirectional system setting	Assign the buffer memory needed to perform data communication using the bidirectional protocol, and change the setting values, etc.	—	—	○	Section 8.4.8	
	CHn PLC CPU monitoring system setting	Set the PLC CPU monitoring function.	○	○	—	Section 8.4.9	
	CHn Transmission user frame No. designation system setting	Set the user frame number to be transmitted, etc.	—	○	—	Section 8.4.10	
System setting default		Reset the setting values in the buffer memory to their default values.	○	○	○	Section 8.4.11	Can be used only via online operation.
System setting write		Write the setting values in the buffer memory to the flash ROM.	○	○	○	Section 8.4.11	
Flash ROM write allow/prohibit designation		Set whether to allow or prohibit writing to the flash ROM.	—	—	—	Section 8.4.12	
X · Y monitor/test		Perform the monitoring/testing of I/O signals to/from the PLC CPU.	○	○	○	Section 8.6.1	
Modem function monitor/test		Monitor the execution status of the modem function.	○	○	○	Section 8.6.2	
Monitor	CHn Transmission control and others monitor/test	Monitor the status of interface control signals, values set from the GX Developer, etc.	○	○	○	Section 8.6.3	
	CHn MC protocol monitor	Monitor the data communication result, I/O signal status, and setting values in the buffer memory.	○	—	—	Section 8.6.4	
	CHn Non procedure monitor/test		—	○	—	Section 8.6.5	
	CHn Bidirectional monitor		—	—	○	Section 8.6.6	
	CHn PLC CPU monitoring monitor	Monitor the setting values and operating status of the PLC CPU monitoring function.	○	○	—	Section 8.6.7	
	CHn User frame No. designation monitor for transmission	Monitor the setting value for user frame to be transmitted.	○	○	—	Section8.6.8	
Monitor/test others		Monitor the data reception result, error occurrence status, etc.	○	○	○	Section 8.6.9	
ERR LED off		Turn off the ERR LEDs on the front face of the module.	○	○	○	Section 8.6.10	
Non procedure protocol receive data clear		Clear the currently received data.	—	○	—	Section 8.7	

3.7 List of GX Developer Setting Items for Serial Communication Modules

The following table lists the parameters that are set using the GX Developer.

Parameter setting item	Parameter description	Set data		Reference section
I/O assignment setting	Performs I/O assignment for the Q series C24 and enables the switch settings listed below.	Type		Section 4.5.1
		Model name		
		Points		
		Start X/Y		
Switch setting	Switch 1	CH1 Transmission setting		Section 4.5.2
		CH1 Communication rate setting		
	Switch 2	CH1 Communication protocol setting		
	Switch 3	CH2 Transmission setting		
		CH2 Communication rate setting		
	Switch 4	CH2 Communication protocol setting		
	Switch 5	Station number setting		
Interrupt pointer setting	Performs setting for reading reception date with interrupt programs.	CPU side	Interrupt pointer Start No.	Section 4.5.3
			Interrupt pointer No. of units	
		Intelligent module side	Start I/O No.	
			Start SI No.	
Remote password settings	Sets the remote password and the Q series C24 that performs the check.	Password settings		Section 3.3.3 of User's Manual (Application)
		Password active module settings	Model name	
			Start XY	

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3.8 List of Input/Output Signals for the PLC CPU

This section describes the input/output signals of the Q series C24.
For assignments of the input/output signals shown in the table below, it is assumed that the Q series C24 is mounted in slot 0 of the basic base unit.
Device numbers starting with X indicate input signals from the Q series C24 to the PLC CPU, and device numbers starting with Y indicate output signals from the PLC CPU to the Q series C24.
The following table lists the input/output signals for the PLC CPU.

Device number	Signal description	Reference section	Device number	Signal description	Reference section
X0 ＊1	CH1 Transmission normal completion ON: Normal completion	Section 8.6.4 Section 8.6.5 Section 8.6.6	Y0	CH1 Transmission request ON: Requesting transmission	—
X1 ＊1	CH1 Transmission abnormal completion ON: Abnormal completion		Y1	CH1 Reception data read completion ON: Data read completed	
X2 ＊1	CH1 Transmission processing ON: Transmission in progress		Y2	CH1 Mode switching request ON: Requesting switch	Application, Chapter 15
X3 ＊2	CH1 Reception data read request ON: Requesting read	Section 6.1 Section 7.1 Section 8.6.5 Section 8.6.6	Y3	Use prohibited	—
X4 ＊2	CH1 Reception abnormal detection ON: Abnormal detection		Y4		
X5	(For system)	—	Y5		
X6 ＊3	CH1 Mode switching ON: Switching	Application, Chapter 15	Y6		
X7 ＊1	CH2 Transmission normal completion ON: Normal Completion	Section 8.6.4 Section 8.6.5 Section 8.6.6	Y7	CH2 Transmission request ON: Requesting transmission	—
X8 ＊1	CH2 Transmission abnormal completion ON: Abnormal completion		Y8	CH2 Reception data read completion ON: Data read completed	
X9 ＊1	CH2 Transmission processing ON: Transmission in progress		Y9	CH2 Mode switching request ON: Requesting switch	Application, Chapter 15
XA ＊2	CH2 Reception data read request ON: Requesting read	Section 6.1 Section 7.1 Section 8.6.5 Section 8.6.6	YA	Use prohibited	—
XB ＊2	CH2 Reception abnormal detection ON: Abnormal detection		YB		
XC	(For system)	—	YC		
XD ＊3	CH2 Mode switching ON: Switching	Application, Chapter 15	YD		
XE	CH1 ERR. occurrence ON: Error occurring	Section 8.6.10 Section 10.1.2	YE	CH1 ERR.clear request ON: Requesting error clear	Section 8.6.10 Section 10.1.2
XF	CH2 ERR. occurrence ON: Error occurring		YF	CH2 ERR. clear request ON: Requesting error clear	
X10 ＊6	Modem initialization completion ON: Initialization completed	Section 8.6.2 Application, Chapter 3	Y10 ＊6	Modem initialization request (standby request) ON: Requesting initialization	Section 8.6.2 Application, Chapter 3
X11 ＊6	Dialing ON: Dial in progress		Y11 ＊6	Connection request ON: Requesting connection	
X12 ＊6	Connection ON: Connection in progress		Y12 ＊6	Modem disconnection request ON: Requesting disconnection	
X13 ＊6	Initialization/connection abnormal completion ON: Initialization/ connection abnormally completed		Y13	Use prohibited	—
X14 ＊6	Modem disconnection complete ON: Disconnection completed		Y14 ＊6	Notification- issued request OFF: Requesting notification issuance	
X15 ＊6	Notification normal completion ON: Normal completion		Y15	Use prohibited	—
X16 ＊6	Notification abnormal completion ON: Abnormal completion		Y16		
X17 ＊1	Flash ROM read completion ON: Completed	—	Y17	Flash ROM read request ON: Requesting	—
X18 ＊1	Flash ROM write completion ON: Completed		Y18	Flash ROM write request ON: Requesting	
X19	Flash ROM system setting write completion ON: Completed		Y19	Flash ROM system setting write request ON: Requesting	

Device number	Signal description	Reference section	Device number	Signal description	Reference section
X1A	CH1 Global signal ON: Output instructed	Section 3.10, Reference	Y1A	Use prohibited	—
X1B	CH2 Global signal ON: Output instructed		Y1B		
X1C	System setting default completion ON: Completed	Section 8.4.11	Y1C	System setting default request ON: Requesting	Section 8.4.11
X1D	(For system)	—	Y1D	Use prohibited	—
X1E ＊4	Q series C24 ready ON: Accessible	—	Y1E		
X1F ＊5	Watchdog timer error (WDT error) ON : Module error occurred OFF: Module being normally operated	—	Y1F		

＊1 The device does not turn on/off by execution of a dedicated instruction when a function that corresponds to the input signal is used.

＊2 The device does turn on/off by execution of a dedicated instruction when a function that corresponds to the input signal is used (from ON to OFF: Data read completed).

＊3 The mode switching signal (X6/XD) turns ON at mode switching, receive clear, user frame receive designation or transmission sequence initialization.
While the mode switching signal (X6/XD) is ON, do not issue a communication request to the target interface.
(The communication processing of the Q series C24 is stopped while the mode switching signal (X6/XD) is ON.)

＊4 The Q series C24 ready signal indicates whether or not it is possible to access the Q series C24 from the PLC CPU.
Use it as a interlock signal for a sequence program.
(It turns on about one second after turning the power ON and reset operation.)

＊5 Restart the PLC CPU when the watchdog timer error signal is turned on (reset the power and the CPU module).

＊6 QJ71C24N-R4 cannot be used. (Related to modem function signal.)
- X10 to X16: For system
- Y10 to Y16: Use prohibited

IMPORTANT

(1) Of the input/output signals to the PLC CPU, the signals marked with "Use prohibited" must not be output (ON).
If any of the "Use prohibited" signals is output, the PLC system may malfunction.

(2) When the modem function is not used or the QJ71C24N-R4 is used, X10 to X16 are used for the system and Y10 to Y16 cannot be used.

POINT

(1) The input/output signals shown in this section are the signals used when a QnA series serial communication module program is utilized for the Q series C24 (see Section 2 in appendix).
In the QCPU, the on/off of input/output signals to intelligent function modules is executed with a dedicated instruction.
It is not necessary to turn the signals on/off by the sequence program, except for the input/output signals shown in the programming of each function reference page.

(2) When a program for a QnA series serial communication module is also utilized for the Q series C24, it is recommended to replace the instructions with the dedicated instructions shown on the corresponding function reference page of each manual for the Q series C24.

3.9 List of Applications and Assignments of the Buffer Memory

This section describes the buffer memory.

(1) Configuration of the buffer memory

A buffer memory consists of a user area and a system area, as shown below.

(a) User area

1) This is the area where users write/read data.
2) The user area consists of areas for storing setting values for data communication, for actual data communication, and for storing communication status and communication error information.
3) Data read/write to the user area should be performed following the instructions in the corresponding detailed reference page.

(b) System area

This area is used by the Q series C24 system.

(2) List of buffer memory assignments

A buffer memory is configured with 16 bits per address.
Name, default value, etc. of each address of the buffer memory is shown in the lists on the following pages.

1) Abbreviations in the target Protocol column
   MC : MC protocol
   Non: Non procedure protocol
   Bi : Bidirectional protocol
2) Meaning of symbols shown in the target Protocol column
   The following symbols are assigned to protocols related to the setting values of a corresponding area and to areas used for controlled with user settings, and indicate what kind of access is allowed to the area in question.
   RW : Area where it is possible to read/write from/to the PLC CPU and an external device.
   R : Area where only reading is possible from the PLC CPU and an external device.
   – : System area used by the system or area not used by the corresponding protocol.
3) Meaning of symbols shown in the Registration allowed/not allowed column
   Indicates whether or not it is possible to use a value in the corresponding area by registering it to the flash ROM of the Q series C24.
   Allowed : Area that can be registered and used.
   Not allowed : Area that cannot be registered.

IMPORTANT

Do not write data in the "System area" of the buffer memory.
If data is written to any of the system areas, the PLC system may malfunction.
Some of the user areas are partially system areas. Care must be taken when performing read/write to the buffer memory.

POINT

(1) Use the FROM/TO instructions or other applicable commands to access the buffer memory shown in this section when a program for a QnA series serial communication module is utilized for the Q series C24 (see Section 2 in Appendix).
In QCPU, the access to the buffer memory of an intelligent function module is executed with a dedicated instruction.
It is not necessary to access directly using the FROM/TO instructions or other instructions from the sequence program, except when accessing the buffer memory as shown in the programming on each function reference page.

(2) When a program for a QnA series serial communication module is utilized for the Q series C24, it is recommended to replace the instructions with the dedicated instructions shown on the corresponding function reference page of each manual for the Q series C24.

(3) The following initial settings (changing the default values) for data communication must be performed by a registration operation using GX Configurator-SC or by executing the CSET instruction for the sequence program.

1) Initial settings for communication using the MC protocol
   - Setting the unit of data length sent by the on-demand function
     Word/byte units designation (addresses 150 (96H), 310 (136H))
   - Setting the buffer memory used by the on-demand function
     Buffer memory head address designation (addresses 160 (A0H), 320 (140H))
     Data length designation (addresses 161 (A1H), 321 (141H))

2) Initial settings for communication using the non procedure/bidirectional protocols
   - Setting the unit of data length to be sent and received
     Word/byte units designation (addresses 150 (96H), 310 (136H))
   - Setting the transmission area
     Transmission buffer memory head address designation (addresses 162 (A2H), 322 (142H))
     Transmission buffer memory length designation (addresses 163 (A3H), 323 (143H))
   - Setting the reception area
     Receive buffer memory head address designation (addresses 166 (A6H), 326 (146H))
     Receive buffer memory length designation (addresses 167 (A7H), 327 (147H))

* For more details on the registration operation by GX Configurator-SC, see the explanation of the system settings of the corresponding protocol in Sections 8.4.5 to 8.4.8.
For more details on the CSET instruction, see Section 16.4 of the User's Manual (Application).

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Applicable protocol Non	Applicable protocol Bi	Registration allowed/not allowed	Reference section
0 (0H)	—	For LED and communication error clear	Communication error clear request for CH1 and to turn LED off 0: ON, No initialization request 1: OFF, Initialization requested SD WAIT (b0) C/N (b4) SIO (b1)) NAK (b5) PRO. (b2) ACK. (b6) P/S (b3) NEU. (b7) For system (b8) to (b15)	0	RW			Not allowed	Section 8.6.10 Section 10.1.1 Section 10.1.2
—	1 (1H)		Communication error clear request for CH2 and to turn LED off 0: ON, No initialization request 1: OFF, Initialization requested SD WAIT (b0) NAK (b5) SIO (b1) ACK. (b6) PRO. (b2) NEU. (b7) P/S (b3) CH2 ERR. (b14) C/N (b4) CH1 ERR. (b15) For system (b8) to (b13)						
2 (2H)		For flash ROM access	Register/read/delete instructions 0: No request 1: Register request 2: Read request 3: Delete request	0	RW	—		Not allowed	Section 8.4.1 Section 8.4.2 Section 8.4.11 Section 8.4.12
3 (3H)			Frame No. direction 0: No designation Other than 0: Frame No.						
4 (4H)			Registration/read/delete result storage 0: Normal completion Other than 0: Abnormal completion						
5 (5H)			Number of data bytes registered designation 0 : No designation Other than 0: Number of data bytes registered (maximum 80 bytes)						
6 to 45 (6H to 2DH)			User frame 0 : No designation Other than 0: Registered data (maximum 80 bytes)						
46 (2EH)		For designation of modem function-1	Modem connection channel designation 0: Non 1: CH1 2: CH2	0	RW			Allowed	Section 8.4.2 Section 8.4.3 Section 8.4.4 Chapter 3 of User's Manual (Application)
47 (2FH)			Notification execution designation 0: Do not execute. 1: Execute.						
48 (30H)			Number of connection retries designation 1 to 5: Number of retries	3					
49 (31H)			Connection retry interval designation 90 to 300: Connection retry interval (unit: s)	180					
50 (32H)			Initialization/connection timeout designation 1 to 60: Timeout (unit: s)	60					
51 (33H)			Number of initialization retries designation 1 to 5: Number of retries	3					
52 (34H)			Data No. for initialization designation 0H : Send initialization data designated by the designated area of the user frame for transmission. 7D0H to 801F: Data No. for initialization	7D0H					
53 (35H)			Data No. for connection designation BB8H to 801FH: Data No. for connection	0					
54 (36H)			GX Developer connection designation 0: Do not connect. 1: Connect.						
55 (37H)			No - communication interval time designation 0 : Wait infinitely 1 to 120: No communication interval (Waiting time for line disconnection) (unit: min.)	30					
56 (38H)			RS · CS control yes/no designation 0: No control 1: Controlled	1					
57 to 143 (39H to 8FH)		Use prohibited	System area	—					

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Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Non	Bi	Registration allowed/not allowed	Reference section
144 (90H)	304 (130H)	For designation of mode switching	Switching mode no. designation (0001H to 0007H, 00FFH) 0001H: MC protocol (format 1) 0005H: MC protocol (format 5) 0002H: MC protocol (format 2) 0006H: Non procedure protocol 0003H: MC protocol (format 3) 0007H: Bidirectional protocol 0004H: MC protocol (format 4) 00FFH: GX Developer connection	0	RW			Not allowed	Section 4.5.2 Chapter 15 of User's Manual (Application)
145 (91H)	305 (131H)		Transmission specifications after switching designation Designates transmission specifications (below) after switching when b15 of this area is 1 (ON). Operation setting (b0) 0: Independent 1: Link Data bit (b1) 0: 7 bit 1: 8 bit Parity bit (b2) 0: No 1: Yes Odd/even parity (b3) 0: Odd 1: Even Stop bit (b4) 0: 1 bit 1: 2 bit Sum check code (b5) 0: No 1: Yes Write during RUN (b6) 0: Prohibited 1: Allowed Setting modification (b7) 0: Prohibited 1: Allowed Communication rate (b8 to b11) 50 bps to 230400 bps For system (b12 to b14) All 0 Transmission specifications after switching (b15) designation 0: Match settings in GX Developer 1: Match settings in this area					
146 (92H)	306 (132H)	Signal setting (*1)	RS and DTR signal status designation 0: Off 1: On RS signal (b0) DTR signal (b2) For system (b1), (b3) to (b15)	0005H	RW			Allowed	Section 3.2.1
147 (93H)	307 (133H)	For designation of transmission control	DTR/DSR(ER/DR), DC control designation • Transmission control (b0) 0: DTR/DSR control 1: DC code control • DC1/DC3 control (b8) 0: No control 1: Controlled • DC2/DC4 control (b9) 0: No control 1: Controlled	0	RW			Allowed	Section 8.4.5 Chapter 7 of User's Manual (Application)
148 (94H)	308 (134H)		DC1/DC3(Xon/Xoff) code designation • DC1 code (b0 to b7) 00H to FFH: DC1 code • DC3 code (b8 to b15) 00H to FFH: DC3 code	1311H					
149 (95H)	309 (135H)		DC2/DC4 code designation • DC2 code (b0 to b7) 00H to FFH: DC2 code • DC4 code (b8 to b15) 00H to FFH: DC4 code	1412H					
150 (96H)	310 (136H)	For designation of communication control	Word/byte units designation 0: Word units 1: Byte units	0	RW				Chapters 6 Chapter 7 Section 8.4.5
151 (97H)	311 (137H)		CD terminal check designation (for RS-232) 0: Check 1: No check	1					Section 3.2.1 Section 8.4.5

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Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Non	Bi	Registration allowed/not allowed	Reference section
152 (98H)	312 (138H)	For designation of communication control	Communication system designation (for RS-232) 0: Full duplex communication 1: Half-duplex communication	0	RW			Allowed	Chapter 7 Section 8.4.5 Section 8.4.8 Chapter 8 of User's Manual (Application)
153 (99H)	313 (139H)	For half- duplex communica-tions control designation (RS-232)	Simultaneous transmission priority/non-priority designation 0: Priority Other than 0: Non-priority (transmission wait time, unit: 100 ms)	0					
154 (9AH)	314 (13AH)		Retransmission time transmission method designation 0: Do not resend. 1: Resend.						
155 (9BH)	315 (13BH)		Simultaneously transmission data valid/invalid designation • Receive data valid/invalid (b0) 0: Valid 1: Invalid • Transmission data valid/invalid (b8) 0: Valid 1: Invalid		—		RW		
156 (9CH)	316 (13CH)	For designation of data communica-tion time monitoring	No-reception monitoring time (timer 0) designation 0H : Wait infinitely 28H to FA0H: Monitoring time (unit: byte)	0H	RW			Allowed	Section 8.4.5 Chapter 6 of User's Manual (Application)
157 (9DH)	317 (13DH)		Response monitoring time (timer 1) designation 0H : Wait infinitely 1H to BB8H: Monitoring time (unit: 100 ms)	32H (5 sec.)	RW	—	RW		
158 (9EH)	318 (13EH)		Transmission monitoring time (timer 2) designation 0H : Wait infinitely 1H to BB8H: Monitoring time (unit: 100 ms)	708H (3 min.)		RW			
159 (9FH)	319 (13FH)	Use prohibited	System area	—					
160 (A0H)	320 (140H)	For designation of on-demand function	Buffer memory head address designation (400H to 1AFFH, 2600H to 3FFFH)	CH1: 400H CH2: 800H	RW	—		Allowed	Section 8.4.6 Reference Manual
161 (A1H)	321 (141H)		Data length designation (0000H to 3400H)	0					
162 (A2H)	322 (142H)	For designation of transmission area	Transmission buffer memory head address designation (400H to 1AFFH, 2600H to 3FFFH)	CH1: 400H CH2: 800H	—	RW	RW		Chapter 6 Chapter 7 Section 8.4.5 Section 8.4.7 Section 8.7
163 (A3H)	323 (143H)		Transmission buffer memory length designation (0001H to 1A00H)	200H					
164 (A4H)	324 (144H)	For data reception	Received data count designation 0001H to 33FEH: Received data count	1FFH			—		
165 (A5H)	325 (145H)		Receive complete code designation FFFFH : No designation for receive complete code 0H to FFH: Receive complete code	0D0AH: (CR+LF)					
166 (A6H)	326 (146H)	For designation of reception area	Receive buffer memory head address designation (400H to 1AFFH, 2600H to 3FFFH)	CH1: 600H CH2: A00H			RW		
167 (A7H)	327 (147H)		Receive buffer memory length designation (0001H to 1A00H)	200H					
168 (A8H)	328 (148H)	For data reception	Receive data clear request 0: No request 1: Requested	0			—	Not allowed	
169 (A9H)	329 (149H)	For designation of on-demand user frame	First frame No. designation 1st 0: No designation Other than 0: Designated	0	RW	—		Allowed	Section 8.4.6 Chapters 9 and 10 of User's Manual (Application)
170 (AAH)	330 (14AH)		First frame No. designation 2nd 0: No designation Other than 0: Designated						
171 (ABH)	331 (14BH)		Last frame No. designation 1st 0: No designation Other than 0: Designated						
172 (ACH)	332 (14CH)		Last frame No. designation 2nd 0: No designation Other than 0: Designated						
173 (ADH)	333 (14DH)	For designation of receive user frame	User frame use enable/disable designation 0: Do not use 1: Use 2: Data communication possible (Q series C24 set)		—	RW	—		Section 8.4.7 Chapters 9 and 11 of User's Manual (Application)
174 to 177 (AEH to B1H)	334 to 337 (14EH to 151H)		First frame No. designation 1st (1st to 4th) 0H: No designation 1H or more: Head frame No.						
178 to 181 (B2H to B5H)	338 to 341 (152H to 155H)		Last frame No. designation (1st to 4th) 0H: No designation 1H or more: Last frame No. 0: No transmission designation 1 or more: Output frame No.	1: 0DH 2: 0AH 3: 0H 4: 0H	—	RW	—		

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Applicable protocol Non	Applicable protocol Bi	Registration allowed/not allowed	Reference section
182 (B6H)	342 (156H)	User frame being transmitted	User frame being transmitted 0 : Not send 1 to 100: User frame being transmitted (nth)	0	—	R	—	Not allowed	Section 8.4.7 Chapters 9 and 11 of User's Manual (Application)
183 (B7H)	343 (157H)	For user frame being transmitted designation	CR/LF output designation 0: Do not send. 1: Send.	0		RW		Allowed	
184 (B8H)	344 (158H)		Output head pointer designation 0: No designation 1 to 100: Send from nth						
185 (B9H)	345 (159H)		Output count designation 0: No designation 1 to 100: Output n						
186 to 285 (BAH to 11DH)	346 to 445 (15AH to 1BDH)		Output frame No. designation (A maximum of 100 can be specified)						
286 (11EH)	446 (1BEH)	For designation of transmission wait time	Message wait time designation 0: No wait time 1H to FH: Wait time (unit: 10 ms)	0	RW	—		Allowed	Section 8.4.6
287 (11FH)	447 (1BFH)	For designation of transparent code	Transmission transparent code designation 1st 0000H : No designation Other than 0000H: Designated (below) • Transparent code (b0 to b7) 00H to FFH: Transparent code • Additional code (b8 to b15) 00H to FFH: Additional code		—	RW			Section 8.4.5 Chapter 12 of User's Manual (Application)
288 (120H)	448 (1C0H)		Receive transparent code designation 0000H : No designation Other than 0000H: Designated (below) • Transparent code (b0 to b7) 00H to FFH: Transparent code • Additional code (b8 to b15) 00H to FFH: Additional code						
289 (121H)	449 (1C1H)	For conversion designation	ASCII-BIN conversion designation 0: No conversion 1: Convert						
290 to 303 (122H to 12FH)	450 to 511 (1C2H to 1EFH)	Use prohibited	System area	—					
512 (200H)		For confirmation of station No. setting status	Station No. (switch setting)	Depends on parameter setting	—	R	—	Not allowed	Section 4.3 Section 4.5.2 Section 8.6.9
513 (201H)		For confirmation of LED ON status and communication error status	LED ON status and communication error status on CH1 side 0: Turned off/OFF, no error 1: Turned on/ON, error SD WAIT (b0) C/N (b4) SIO (b1) NAK (b5) PRO. (b2) ACK. (b6) P/S (b3) NEU. (b7) For system (b8) to (b15)	Depends on module status					
514 (202H)			LED ON status and communication error status on CH2 side 0: Turned off/OFF, no error 1: Turned on/ON, error SD WAIT (b0) NAK (b5) SIO (b1) ACK. (b6) PRO. (b2) NEU. (b7) P/S (b3) CH2.ERR. (b14) C/N (b4) CH1 ERR. (b15) For system (b8) to (b13)						

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Applicable protocol Non	Applicable protocol Bi	Registration allowed/not allowed	Reference section
515 (203H)		For confirmation of switch setting and mode switching	Switch setting error and mode switching error status 0: No error Other than 0: Switch setting error and mode switching error CH1 Communication protocol setting No. (b0) 0: Normal 1: Error CH1 Communication rate setting (b1) 0: Normal 1: Error CH1 Setting change prohibit time mode switching (b3) 0: Normal 1: Error CH2 Communication protocol setting No. (b4) 0: Normal 1: Error CH2 Communication rate setting (b5) 0: Normal 1: Error CH2 Setting change prohibit time mode switching (b7) 0: Normal 1: Disable Setting station No. (b14) 0: Normal 1: Out of range Linked operation setting (b15) 0: Normal 1: Error	0	R			Not allowed	Section 4.3 Section 4.5.2 Section 8.6.9
516 (204H)		For confirmation of user frame	Number of registered user frames 0H: No registration 1 or more: Number of registered frames	Depends on registration status	R	—		Not allowed	Section 8.6.9
517 to 541 (205H to 21DH)			User frame registration status (for confirmation of registration No.) 0: No registration 1: Registered * Bit corresponding to registration No. is 0(ON)/1(OFF). Registration No.3E8H (1000) : Address 205H (b0) to Registration No. 4AFH (1199) : Address 211H (b7)						
542 (51EH)			Number of registered default registration frames (for system)						Section 8.6.9 Section 9.1.2 of User's Manual (Application)
543 (51FH)		Use prohibited	System area	—					
544 (220H)		For confirmation of flash ROM write result	Flash ROM system parameters write result 0 : Normal completion Other than 1 (error code) : Abnormal completion	0	RW			Not allowed	Section 8.6.9
545 (221H)		For confirmation of modem function	Modem function error code (error code when modem function is being used) 0 : Normal completion Other than 1 (error code) : Abnormal completion		R			Not allowed	Section 8.6.2 Chapter 3 of User's Manual (Application)
546 (222H)			Modem function sequence status 0: Idle 7: Modem disconnected 1: Waiting for initialization 8: Callback Request reception waiting 2: Initializing modem 9: Callback Modem disconnect waiting 3: Waiting 10: Callback Delay time waiting 4: Checking password 11: Callback Reconnecting 5: Communicating 12: Callback Rechecking password 6: Notification in progress						
547 (223H)			Number of data registration for connection 0: No registration 1 or more: Number of registration						
548 to 549 (224H to 225H)			Data registration status for connection (for confirmation of registration No.) 0: No registration 1: Registered * Bit corresponding to registration No. is 0(ON)/1(OFF). Registration No. BB8H (3000) : Address 224H (b0) to Registration No. BD5H (3029) : Address 225H (b13)						
550 (226H)			Number of data registration for initialization 0: No registration 1 or more: Number of registrations						

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Non	Bi	Registration allowed/not allowed	Reference section
551 to 552 (227H to 228H)		For confirmation of modem function	Data registration status for initialization (for confirmation of registration No.) 0: No registration 1: Registered * Bit corresponding to registration No. is 0(ON)/1(OFF). Registration No.9C4H (2500) : Address 227H (b0) to Registration No. 9E1H (2529) : Address 228H (b13)	0	R			Not allowed	Section 8.6.2 Chapter 3 of User's Manual (Application)
553 (229H)		For confirmation of notification status	Number of notification execution 0: Not executed 1 or more: Number of executions	0	R				
554 (22AH)			Data storage area 1: Notification execution data No. 0 : Notification not executed BB8H or more: Notification executed (notification execution No.)	0	R				
555 to 557 (22BH to 22DH)			Data storage area 1: System area (use prohibited)	—					
558 to 561 (22EH to 231H)			Data storage area 2	The configuration of each area is the same as the data storage area 1.					
562 to 565 (232H to 235H)			Data storage area 3						
566 to 569 (236H to 239H)			Data storage area 4						
570 to 573 (23AH to 23DH)			Data storage area 5						
574 to 590 (23EH to 24EH)		Use prohibited	System area	—					
591 (24FH)		For confirmation of station No. setting status (*3)	Station No. (instruction setting)	Depends on module status	R			Not allowed	Section 4.5.2 Section 8.6.3 Section 10.1.6
592 (250H)	608 (260H)	For confirmation of transmission control status	Communication protocol status (switch setting) 0: GX Developer connection 5: MC protocol (format 5) 1: MC protocol (format 1) 6: Non procedure protocol 2: MC protocol (format 2) 7: Bidirectional protocol 3: MC protocol (format 3) 8: (For linked operation) 4: MC protocol (format 4)	Depends on parameter setting	R			Not allowed	Section 4.5.2 Section 8.6.3 Section 10.1.5
593 (251H)	609 (261H)		Transmission setting status (switch setting) Operation setting (b0) 0: Independent 1: Link Data bit (b1) 0: 7 bit 1: 8 bit Parity bit (b2) 0: No 1: Yes Odd/even parity (b3) 0: Odd 1: Even Stop bit (b4) 0: 1 bit 1: 2 bit Sum check code (b5) 0: No 1: Yes Write during RUN (b6) 0: Prohibited 1: Allowed Setting modification (b7) 0: Prohibited 1: Allowed Communication rate (b8 to b11) 50 bps to 230400 bps For system (b12 to b15) All 0					
594 (252H)	610 (262H)		Communication protocol status (current) 0: GX Developer connection 5: MC protocol (format 5) 1: MC protocol (format 1) 6: Non procedure protocol 2: MC protocol (format 2) 7: Bidirectional protocol 3: MC protocol (format 3) 8: (For linked operation) 4: MC protocol (format 4)						Section 4.5.2 Section 8.6.3 Section 10.1.6
595 (253H)	611 (263H)		Transmission status (current) Operation setting (b0) 0: Independent 1: link Data bit (b1) 0: 7 bit 1: 8 bit Parity bit (b2) 0: No 1: Yes Odd/even parity (b3) 0: Odd 1: Even Stop bit (b4) 0: 1 bit 1: 2 bit Sum check code (b5) 0: No 1: Yes Write during RUN (b6) 0: Prohibited 1: Allowed Setting modification (b7) 0: Prohibited 1: Allowed Communication rate (b8 to b11) 50 bps to 230400 bps For system (b12 to b15) All 0					
596 (254H)	612 (264H)	Control signal status	RS-232 control signal status 0: OFF status 1: ON status RS (b0) DTR (b2) CS (b4) DSR (b1) CD (b3) RI (b5) Not used (b6 to b15) All 0	Depends on signal status	R				Section 8.6.3 Section 10.1.3

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Non	Bi	Registration allowed/not allowed	Reference section
597 (255H)	613 (265H)	For confirmation of communication result	Transmission sequence status (For confirmation of MC protocol communication status) 0: Waiting for receiving command 1: Receiving command 2: Command reception complete 3: Waiting to access PLC CPU 4: Accessing PLC CPU 5: PLC CPU access complete 6: Response message transmission	0	R	—		Not allowed	Section 8.6.4 Section 10.1.4
598 (256H)	614 (266H)		On-demand execution result 0 : Normal completion 1 or more: Abnormal completion (error code)		RW	—			
599 (257H)	615 (267H)		Data transmission result 0 : Normal completion 1 or more: Abnormal completion (error code)		RW				Chapter 6 Chapter 7 Section 8.6.5 Section 8.6.6
600 (258H)	616 (268H)		Data reception result 0 : Normal completion 1 or more: Abnormal completion (error code)						
601 (259H)	617 (269H)		System area	—					
602 (25AH)	618 (26AH)		MC protocol transmission error code (excludes A compatible 1C frame communication) 0: No error 1 or more: Transmission error code	0	RW	—		Not allowed	Section 8.6.4
603 (25BH)	619 (26BH)		Receive user frame (nth) 0 : Not received 1 to 4: Combination of user frame No. designations for reception message		—	R	—		Section 8.6.5
604 to 607 (25CH to 25FH)	620 to 1023 (26CH to 3FFH)	Use prohibited	System area	—					
1024 (400H)	2048 (800H)	Transmission/receive area	Transmission data count designation 0: No designation 1 or more: Number of send data	0	RW			Not allowed	Chapter 6 Chapter 7 Section 8.4.5 Section 8.4.7
1025 to 1535 (401H to 5FFH)	2049 to 2559 (801H to 9FFH)		Transmission data designation Data to be sent to an external device						
1536 (600H)	2560 (A00H)		Receive data count (Number of data for which read is requested) 0: No receive data 1 or more: Number of receive data						
1537 to 2047 (601H to 7FFH)	2561 to 3071 (A01H to BFFH)		Receive data Data received from an external device						
3072 to 6911 (C00H to 1AFFH)		For user	User free area (3840 words) * Determined by the user.	0	RW			Not allowed	—
6912to 6952 (1B00H to 1B28H)			For registration No. 8001H						
6953 to 6993 (1B29H to 1B51H)			For registration No. 8002H						
6994 to 7034 (1B52H to 1B7AH)			For registration No. 8003H						
7035 to 7075 (1B7BH to 1BA3H)			For registration No. 8004H						
7076 to 7116 (1BA4H to 1BCCH)			For registration No. 8005H						
7117 to 7157 (1BCDH to 1BF5H)			For registration No. 8006H						
7158 to 7198 (1BF6H to 1C1EH)			For registration No. 8007H						
7199 to 7239 (1C1FH to 1C47H)			For registration No. 8008H						
7240 to 7280 (1C48H to 1C70H)			For registration No. 8009H						
7281 to 7321 (1C71H to 1C99H)			For registration No. 800AH						
7322 to 7362 (1C9AH to 1CC2H)			For registration No. 800BH						
7363 to 7403 (1CC3H to 1CEBH)			For registration No. 800CH						
7404 to 7444 (1CECH to 1D14H)			For registration No. 800DH						
7445 to 7485 (1D15H to 1D3DH)			For registration No. 800EH						

The user registration area has the following combined uses, with data written by the user according to the purpose of use by the TO instruction, etc.
See each explanation item concerning the configuration of each area, the data written, etc.
(1) If data communications is being carried out by user registration frame.
- User registration frame (User's Manual (Application), Chapter 9)

(2) If data communications is being carried out by the modem function.
- Initialization Data (User's Manual (Application) Section 3.4.3)
- Connection Data (User's Manual (Application) Section 3.4.4)

Not allowed | Refer to left description

Address Decimal (Hex) CH1	CH2	Application	Name	Initial value	Applicable protocol MC	Non	Bi	Registration allowed/not allowed	Reference section
7486 to 7526 (1D3EH to 1D66H)			For registration No. 800FH	The user registration area has the following combined uses, with data written by the user according to the purpose of use by the TO instruction, etc. See each explanation item concerning the configuration of each area, the data written, etc. (1) If data communications is being carried out by user registration frame. • User registration frame (User's Manual (Application), Chapter 9) (2) If data communications is being carried out by the modem function. • Initialization Data (User's Manual (Application) Section 3.4.3) • Connection Data (User's Manual (Application) Section 3.4.4)				Not allowed	Refer to left description
7527 to 7567 (1D67H to 1D8FH)			For registration No. 8010H						
7568 to 7608 (1D90H to 1DB8H)			For registration No. 8011H						
7609 to 7649 (1DB9H to 1DE1H)			For registration No. 8012H						
7650 to 7690 (1DE2H to 1E0AH)			For registration No. 8013H						
7691 to 7731 (1E0BH to 1E33H)			For registration No. 8014H						
7732 to 7772 (1E34H to 1E5CH)			For registration No. 8015H						
7773 to 7813 (1E5DH to 1E85H)			For registration No. 8016H						
7814 to 7854 (1E86H to 1EAEH)			For registration No. 8017H						
7855 to 7895 (1EAFH to 1DE7H)			For registration No. 8018H						
7896 to 7936 (1ED8H to 1F00H)			For registration No. 8019H						
7937 to 7977 (1F01H to 1F29H)			For registration No. 801AH						
7978 to 8018 (1F2AH to 1F52H)			For registration No. 801BH						
8019 to 8059 (1F53H to 1F7BH)			For registration No. 801CH						
8060 to 8100 (1F7CH to 1FA4H)			For registration No. 801DH						
8101 to 8141 (1FA5H to 1FCDH)			For registration No. 801EH						
8142 to 8182 (1FCEH to 1FF6H)			For registration No. 801FH						
8183 to 8191 (1FF7H to 1FFFH)		Use prohibited	System area	—					
8192 (2000H)		System designation	Flash ROM write allow/prohibit designation 0: Write prohibited 1: Write allowed	0	RW			Not allowed	Section 8.4.12
8193 (2001H)		For callback function	Callback function designation 0H: Auto 1H: Callback connection (during fixed)·····(Setting 4) 3H: Callback connection (during designated number)·····(Setting 5) 7H: Callback connection (during max. designated number is 10)·····(Setting 6) 9H: Auto/Callback connection (during fixed)·····(Setting 1) BH: Auto/Callback connection (during designated number)·····(Setting 2) FH: Auto/Callback connection (during max. designated number is 10)·····(Setting 3)	0	RW	—		Allowed	Section 8.4.4 Chapter 3 of User's Manual (Application)
8194 (2002H)			Callback denial notification accumulated count designation 0H: Not specified 1H to FFFFH: Notification accumulated number count	1					
8195 to 8198 (2003H to 2006H)		Use prohibited	System area	—					
8199 (2007H)		For designation of modem function -2	Auto modem initialization designation 0: Do not auto initialize 1: Auto initialize	0	RW			Allowed	Section 8.4.4 Chapter 3 of User's Manual (Application)
8200 (2008H)			Modem initialization time DR (DSR) signal valid/invalid designation 0: Do not ignore DR signal. 1: Ignore DR signal.	1					
8201 (2009H)			Complete signal handling for modem function designation 0: Do not turn on/off X13 to X16. 1: Turn on/off X13 to X16.	1					
8202 (200AH)			Wait time of notification designation 0000H to FFFFH: Wait time (unit: s)	10					
8203 (200BH)		Use prohibited	System area	—					
8204 (200CH)		For remote password function	Remote password mismatch notification count designation 0H: No designation 1H to FFFFH: Notification times	0	RW	—		Allowed	Section 5.1.5 Section 8.4.4 Chapter 3 of User's Manual (Application)
8205 (200DH)			Remote password mismatch notification accumulated count designation 0H: No designation 1H to FFFFH: Cumulative times of notification	1					

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Non	Bi	Registration allowed/not allowed	Reference section
8206 (200EH)		For designation of modem function -3	Circuit disconnect wait time (PLC CPU watch use) 0000H to FFFFH: Wait time (unit: s)	0	RW		—	Allowed	Section 8.4.4 Chapter 3 of User's Manual (Application)
8207 (200FH)	8456 to 8463 (2108H to 210FH)	Use prohibited	System area	—					
8208 (2010H)	8464 (2110H)	Interrupt designation	Receive interrupt-issued designation 0: Do not issue interrupt. 1: Issue interrupt.	0	—	RW		Allowed	Chapter 4 of User's Manual (Application)
8209 (2011H)	8465 (2111H)	Use prohibited	System area	—					
8210 (2012H)	8466 (2112H)	For transmission control designation (＊1)	Transmission control start free area designation 64 to 4,095: transmission control start free area	64	RW			Allowed	Chapter 7 of User's Manual (Application)
8211 (2013H)	8467 (2113H)		Transmission control end free area designation 263 to 4096: transmission control end free area	263					
8212 (2014H)	8468 (2114H)		Non procedure and non reception monitoring time format designation 0: Format-0 1: Format-1	0	—	RW	—		Chapter 6 of User's Manual (Application)
8213 to 8215 (2015H to 2017H)	8469 to 8471 (2115H to 2117H)	Use prohibited	System area	—					
8216 (2018H)	8472 (2118H)	Communication data monitoring function (＊1)	Communication data monitoring designation 0000H: No monitor/stopped monitor designation 0001H: Monitor start designation 0002H: Monitoring (Q series C24 is a set.) 1002H: Monitoring stopped (Q series C24 is set.) 100FH: Monitor setting error (Q series C24 is a set.)	0	RW			Allowed	Chapter 16 of User's Manual (Application)
8217 (2019H)	8473 (2119H)		Data optional designation 0: Off 1: On Full stop designation (b0) Timer 0 errors at occurrence stop designation (b2) For system (b1), (b3) to (b15)	0					
8218 (201AH)	8474 (211AH)		Monitor buffer head address designation (400H to 1AFDH,2600H to 3FFDH)	CH1: 2600H CH2: 3300H					
8219 (201BH)	8475 (211BH)		Monitor buffer size designation (0003H to 1A00H)	0D00H					
8220 to 8223 (201CH to 201FH)	8476 to 8479 (211CH to 211FH)	Use prohibited	System area	—					
8224 to 8227 (2020H to 2023H)	8480 to 8483 (2120H to 2123H)	For designation of user frame receiving method	User frame receive format designation (1st to 4th) 0: Format-0, 1: Format-1	0	—	RW	—	Allowed	Section 3.4.7 Chapter 11 of User's Manual (Application)
8228 to 8231 (2024H to 2027H)	8484 to 8487 (2124H to 2127H)		Exclusive format-1 received data count (1st to 4th) 0 or more: Exclusive format-1 received data count						
8232 to 8239 (2028H to 202FH)	8488 to 8495 (2128H to 212FH)	Use prohibited	System area	—					
8240 to 8248 (2030H to 2038H)	8496 to 8504 (2130H to 2138H)	For designation of transparent code	Transmission transparent code designation (2nd to 4th) 0000H :No designation Other than 0000H :Designated (below) • Transparent code (b0 to b7) 00H to FFH : Transparent code • Additional code (b8 to b15) 00H to FFH : Additional code	0	—	RW		Allowed	Section 3.4.5 Chapter 12 of User's Manual (Application)
8249 to 8255 (2039H to 203FH)	8505 to 8511 (2139H to 213FH)	Use prohibited	System area	—					

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Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Applicable protocol Non	Applicable protocol Bi	Registration allowed/not allowed	Reference section
8256 (2040H)	8512 (2140H)	For designation of PLC CPU monitoring function	Cycle time units designation 0: 100 ms 1: s 2: min	2	R	—	—	Allowed	Chapter 2 of User's Manual (Application)
8257 (2041H)	8513 (2141H)		Cycle time designation 0H : No designation 1H to FFFFH: PLC CPU monitoring cycle time	5H					
8258 (2042H)	8514 (2142H)		PLC CPU monitoring function designation 0: Do not use the function. 1: Fixed cycle transmission 2: Condition agreement transmission	0					
8259 (2043H)	8515 (2143H)		PLC CPU monitoring transmission measure designation (for fixed cycle transmission) 0: Data transmission (device data and CPU status data) 1: Notification	0					
8260 (2044H)	8516 (2144H)		Transmission pointer designation (For fixed cycle transmission and data transmission) 1 to 100: Output head point (send from the nth) * Send the user frames designated in the following transmission frame No. designation areas from the designated pointer position. (addresses: CH1 side = BAH to 11DH, CH2 side = 15AH to 1BDH)						
8261 (2045H)	8517 (2145H)		Output count designation (for fixed cycle transmission and data transmission) 1 to 100:Output count (designate the number of frame transmissions.)						
8262 (2046H)	8518 (2146H)		Data No. for connection designation (for fixed cycle transmission and notification) 0BB8H to 0BD5H, 8001H to 801FH: Data No. for connection						
8263 to 8268 (2047H to 204CH)	8519 to 8524 (2147H to 2149H)	Use prohibited	System area	—					
8269 (204DH)	8225 (214DH)	For designation of PLC CPU monitoring function	Number of registered word blocks designation 0 : No designation 1 to 10: Number of blocks of word devices It is possible to designate a maximum of 10 blocks in total.	0	R	—	—	Allowed	Chapter 2 of User's Manual (Application)
8270 (204EH)	8226 (214EH)		Number of registered bit blocks designation 0 : No designation 1 to 10: Number of blocks of bit devices						
8271 (204FH)	8527 (214FH)		PLC CPU abnormal monitoring designation 0: Do not monitor. 1: Monitor.						
8272 (2050H)	8528 (2150H)		No. 1 block monitoring device: Monitoring device designation 90H to CCH: Device code						
8273 to 8274 (2051H to 2052H)	8529 to 8530 (2151H to 2152H)		No. 1 block monitoring device: Head device No. designation 0 or more: Head device No.						
8275 (2053H)	8531 (2153H)		No. 1 block monitoring device: Read point designation 1 or more: Number to read points						
8276 (2054H)	8532 (2154H)		No. 1 block monitoring device: Monitoring condition designation (judgment condition designation) 1 or more: Monitoring condition						
8277 (2055H)	8533 (2155H)		No. 1 block monitoring device: Monitoring condition value designation At bit device 0: OFF 1: ON At word device 0 to FFFFH: Monitoring condition value						
8278 (2056H)	8534 (2156H)		No. 1 block monitoring device: Transmission pointer designation (for condition agreement transmission and data transmission) 1 to 100: Output head point (send from nth) * Send the user frames designated in the following transmission frame No. designation areas from the designated pointer position. (address: CH1 side = BAH to 11DH, CH2 side = 15AH to 1BDH)						
8279 (2057H)	8535 (2157H)		No. 1 block monitoring device: Output count designation (for condition agreement transmission and data transmission) 1 to 100: Output count (designate the number of frame transmissions)						
8280 (2058H)	8536 (2158H)		No. 1 block monitoring device: Data No. for connection designation (for condition agreement transmission and notification) 0BB8H to 0BD5H, 8001H to 801FH: Data No. for connection						
8281 to 8361 (2059H to 20A9H)	8537 to 8617 (2159H to 21A9H)	For designation of PLC CPU monitoring function	Block monitoring devices No. 2 to 10 The structure of each area is the same as the first block monitoring device area See *2 for the details of each area.						
8362 to 8421 (20AAH to 20E5H)	8618 to 8677 (21AAH to 21E5H)	Use prohibited	System area	—					

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name		Initial value	Applicable protocol MC	Applicable protocol Non	Applicable protocol Bi	Registration allowed/not allowed	Reference section
8422 (20E6H)	8678 (21E6H)	For designation of PLC CPU monitoring function	CPU abnormal monitoring designation	Transmission pointer designation (for condition agreement transmission) 1 to 100: Output head point (send from nth) * Send the user frames designated in the following transmission frame No. designation areas from the designated pointer position. (address: CH1 side = BAH to 11DH, CH2 side = 15AH to 1BDH)	0	R		—	Allowed	Chapter 2 of User's Manual (Application)
8423 (20E7H)	8679 (21E7H)			Output count designation (for condition agreement transmission) 1 to 100: Output count (designate the number of frame transmissions)						
8424 (20E8H)	8680 (21E8H)			Data No. for connection designation (for condition agreement transmission and notification) 0BB8H to 0BD5H, 8001H to 801FH: Data No. for connection						
8425 to 8447 (20E9H to 20FFH)	8681 to 8703 (21E9H to 21FFH)	Use prohibited	System area		—					
8448 (2100H)		Use Prohibited	System area		—					
8449 (2101H)		For callback function	Data No. for callback designation 1 0BB8H to 0BD5H, 8001H to 801FH: Data number for callback.		0	RW	—		Allowed	Section 8.4.4 Chapter 3 of User's Manual (Application)
8450 (2102H)			Data No. for callback designation 2							
8451 (2103H)			Data No. for callback designation 3							
8452 (2104H)			Data No. for callback designation 4							
8453 (2105H)			Data No. for callback designation 5							
8454 (2106H)			Data No. for callback designation 6							
8455 (2107H)			Data No. for callback designation 7							
8456 (2108H)			Data No. for callback designation 8							
8457 (2109H)			Data No. for callback designation 9							
8458 (210AH)			Data No. for callback designation 10							
8704 to 8707 (2200H to 2203H)	8960 to 8963 (2300H to 2303H)	Use prohibited	System area		—					
8708 (2204H)	8964 (2304H)	PLC CPU monitoring function	PLC CPU monitoring function operation status 0: Not executed (waiting for registration of PLC CPU monitoring) 1: Wait for PLC CPU monitoring time (waiting to access PLC CPU) 2: Accessing PLC CPU 3: Sending monitoring results		0	R		—	Not allowed	Chapter 2 of User's Manual (Application)
8709 (2205H)	8965 (2305H)		PLC CPU monitoring function execution result (current) 0: Normal completion 1 or more: Abnormal completion (error code)							
8710 (2206H)	8966 (2306H)		PLC CPU monitoring function number of transmission 0: Not executed 1 or more: Number of transmissions							
8711 (2207H)	8967 (2307H)		Monitoring condition arrival block No. 0 : The monitoring condition is not enabled for any block 1 to 10: Registration order of word/bit block (nth) 4096 : CPU abnormal monitoring block * The latest block No. for which monitoring condition is enabled is stored.							
8712 to 8954 (2208H to 22FAH)	8968 to 9215 (2308H to 23FFH)	Use prohibited	System area		—					

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Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Applicable protocol MC	Applicable protocol Non	Applicable protocol Bi	Registration allowed/not allowed	Reference section
8944 ($22F0_H$)		For callback function	Callback permit accumulated count 0 or more : Accumulated count	0	RW	—		Not allowed	Section 8.6.2 Chapter 3 of User's Manual (Application)
8945 ($22F1_H$)			Callback denial accumulated count 0 or more : Accumulated count						
8946 ($22F2_H$)			Auto (callback) connection permit accumulated count 0 or more : Accumulated count						
8947 ($22F3_H$)			Auto (callback) connection denial accumulated count 0 or more : Accumulated count						
8948 ($22F4_H$)			Accumulated count of callback receive procedure cancel 0 or more : Accumulated count						
8949 to 8954 ($22F5_H$ to $22FA_H$)		Use prohibited	System area	—					
8955 ($22FB_H$)		For the remote password function	Accumulated count of unlock process normal completion 0 or more: Accumulated count of normal completion	0	RW	—		Not allowed	Section 5.1.5 Section 8.6.2 Chapter 3 of User's Manual (Application)
8956($22FC_H$)			Accumulated count of unlock process abnormal completion processing 0 or more: Accumulated count of abnormal completion						
8957 to 8958 ($22FD_H$ to $22FE_H$)		Use prohibited	System area	—					
8959($22FF_H$)		For the remote password function	Accumulated count of lock process based on circuit disconnection 0 or more: Accumulated count of lock process based on circuit disconnection	0	RW	—		Not allowed	Section 5.1.5 Section 8.6.2 Chapter 3 of User's Manual (Application)
9216(2400_H)		Use prohibited	System area	—					
9217(2401_H)		For flash ROM write count housing	Flash ROM write count 0 to 1000: Write count	0	R			Not allowed	—
9218 to 9427 (2402_H to $25FF_H$)		Use prohibited	System area	—					
9728 to 16383 (2600_H to $3FFF_H$)		For user (＊1)	User free area 2 (6656 words) (Transmission/receiving data monitoring function default buffer) ＊ Usage is determined by the user.	0	RW			Not allowed	—

＊1 Only QJ71C24N (-R2/R4) is usable. (System area when using QJ71C24 (-R2)

＊2 The following tables show the areas of block monitoring devices No. 1 to 10 (CH1 side: 8272 to 8361 (2050_H to $20A9_H$), CH2 side: 8528 to 8617 (2150_H to $21A9_H$)), which are assigned for designating the PLC CPU monitoring function.

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[CH1 side buffer memory address: decimal (hexadecimal)]

nth block monitoring device										Name
1	2	3	4	5	6	7	8	9	10	
8272 (2050H)	8281 (2059H)	8290 (2062H)	8299 (206BH)	8308 (2074H)	8317 (207DH)	8326 (2086H)	8335 (208FH)	8344 (2098H)	8353 (20A1H)	Monitoring device designation
8273 to 8274 (2051H to 2052H)	8282 to 8283 (205AH to 205BH)	8291 to 8292 (2063H to 2064H)	8300 to 8301 (206CH to 206DH)	8309 to 8310 (2075H to 2076H)	8318 to 8319 (207EH to 207FH)	8327 to 8328 (2087H to 2088H)	8336 to 8337 (2090H to 2091H)	8345 to 8346 (2099H to 209AH)	8354 to 8355 (20A2H to 20A3H)	Head device No. designation
8275 (2053H)	8284 (205CH)	8293 (2065H)	8302 (206EH)	8311 (2077H)	8320 (2080H)	8329 (2089H)	8338 (2092H)	8347 (209BH)	8356 (20A4H)	Designation of number of points read
8376 (2054H)	8385 (205DH)	8294 (2066H)	8303 (206FH)	8312 (2078H)	8321 (2081H)	8330 (208AH)	8339 (2093H)	8348 (209CH)	8357 (20A5H)	Monitoring condition designation (Judgment condition designation)
8277 (2055H)	8286 (205EH)	8295 (2067H)	8304 (2070H)	8313 (2079H)	8322 (2082H)	8331 (208BH)	8340 (2094H)	8349 (209DH)	8358 (20A6H)	Monitoring condition value designation
8278 (2056H)	8287 (205FH)	8296 (2068H)	8305 (2071H)	8314 (207AH)	8323 (2083H)	8332 (208CH)	8341 (2095H)	8350 (209EH)	8359 (20A7H)	Transmission pointer designation (for conditional transmission, data transmission)
8279 (2057H)	8288 (2060H)	8297 (2069H)	8306 (2072H)	8315 (207BH)	8324 (2084H)	8333 (208DH)	8342 (2096H)	8351 (209FH)	8360 (20A8H)	Designation of number of outputs (for conditional transmission, data transmission)
8280 (2058H)	8289 (2061H)	8298 (206AH)	8307 (2073H)	8316 (207CH)	8325 (2085H)	8334 (208EH)	8343 (2097H)	8352 (20A0H)	8361 (20A9H)	Designation of data No. for connection (for conditional transmission and notification)

[CH2 side buffer memory address: decimal (hexadecimal)]

nth block monitoring device										Name
1	2	3	4	5	6	7	8	9	10	
8528 (2150H)	8537 (2159H)	8546 (2162H)	8555 (216BH)	8564 (2174H)	8573 (217DH)	8582 (2186H)	8591 (218FH)	8600 (2198H)	8609 (21A1H)	Monitoring device designation
8529 to 8530 (2151H to 2152H)	8538 to 8539 (215AH to 215BH)	8547 to 8548 (2163H to 2164H)	8556 to 8557 (216CH to 216DH)	8565 to 8566 (2175H to 2176H)	8574 to 8575 (217EH to 217FH)	8583 to 8584 (2187H to 2188H)	8592 to 8593 (2190H to 2191H)	8601 to 8602 (2199H to 219AH)	8610 to 8611 (21A2H to 21A3H)	Head device No. designation
8531 (2153H)	8540 (215CH)	8549 (2165H)	8558 (216EH)	8567 (2177H)	8576 (2180H)	8585 (2189H)	8594 (2192H)	8603 (219BH)	8612 (21A4H)	Designation of number of points read
8532 (2154H)	8541 (215DH)	8550 (2166H)	8559 (216FH)	8568 (2178H)	8577 (2181H)	8586 (218AH)	8595 (2193H)	8604 (219CH)	8613 (21A5H)	Monitoring condition designation (Judgment condition designation)
8533 (2155H)	8542 (215EH)	8551 (2167H)	8560 (2170H)	8569 (2179H)	8578 (2182H)	8587 (218BH)	8596 (2194H)	8605 (219DH)	8614 (21A6H)	Monitoring condition value designation
8534 (2156H)	8543 (215FH)	8552 (2168H)	8561 (2171H)	8570 (217AH)	8579 (2183H)	8588 (218CH)	8597 (2195H)	8606 (219EH)	8615 (21A7H)	Transmission pointer designation (for conditional transmission, data transmission)
8535 (2157H)	8544 (2160H)	8553 (2169H)	8562 (2172H)	8571 (217BH)	8580 (2184H)	8589 (218DH)	8598 (2196H)	8607 (219FH)	8616 (21A8H)	Designation of number of outputs (for conditional transmission, data transmission)
8536 (2158H)	8545 (2161H)	8554 (216AH)	8563 (2173H)	8572 (217CH)	8581 (2185H)	8590 (218EH)	8599 (2197H)	8608 (21A0H)	8617 (21A9H)	Designation of data No. for connection (for conditional transmission and notification)

∗3 Only the QJ71C24N(-R2/R4) whose first 5 digits of the serial No. are 06062 or later is applicable. (System area for other than the one described on the left)

4 SETTINGS AND PROCEDURES PRIOR TO OPERATION

This chapter explains the settings and procedures required before starting a system that uses the Q series C24.

POINT
(1) When using the Q series C24, please read the safety precautions at the beginning of this manual. (2) The installation and setup methods of the Q series C24 are the same as those for CPU modules. (3) For module installation and setup, see the user's manual for the PLC CPU used.

4.1 Handling Precautions

The following explains the precautions for handling the Q series C24:

(1) Do not drop the module or subject it to heavy impact since it is made of resin.

(2) Tighten the module terminal and fixing screws within the specified tightening torque range as follows:

Screw location	Tightening torque range
RS-422/485 terminal block terminal screws (M3 screw)	0.42 to 0.58 N · m
RS-422/485 plug-in connector socket terminal screw for QJ71C24N-R4 (M2 screw)	0.20 to 0.25 N · m
Module fixing screw (normally not required) (M3 screw) (*1)	0.36 to 0.48 N · m

*1 A module can be easily fixed to a base unit using the hooks in the upper part of the module. However, it is recommended that the module be fixed using the module mounting screws when it is used in a place subject to vibration or impact.

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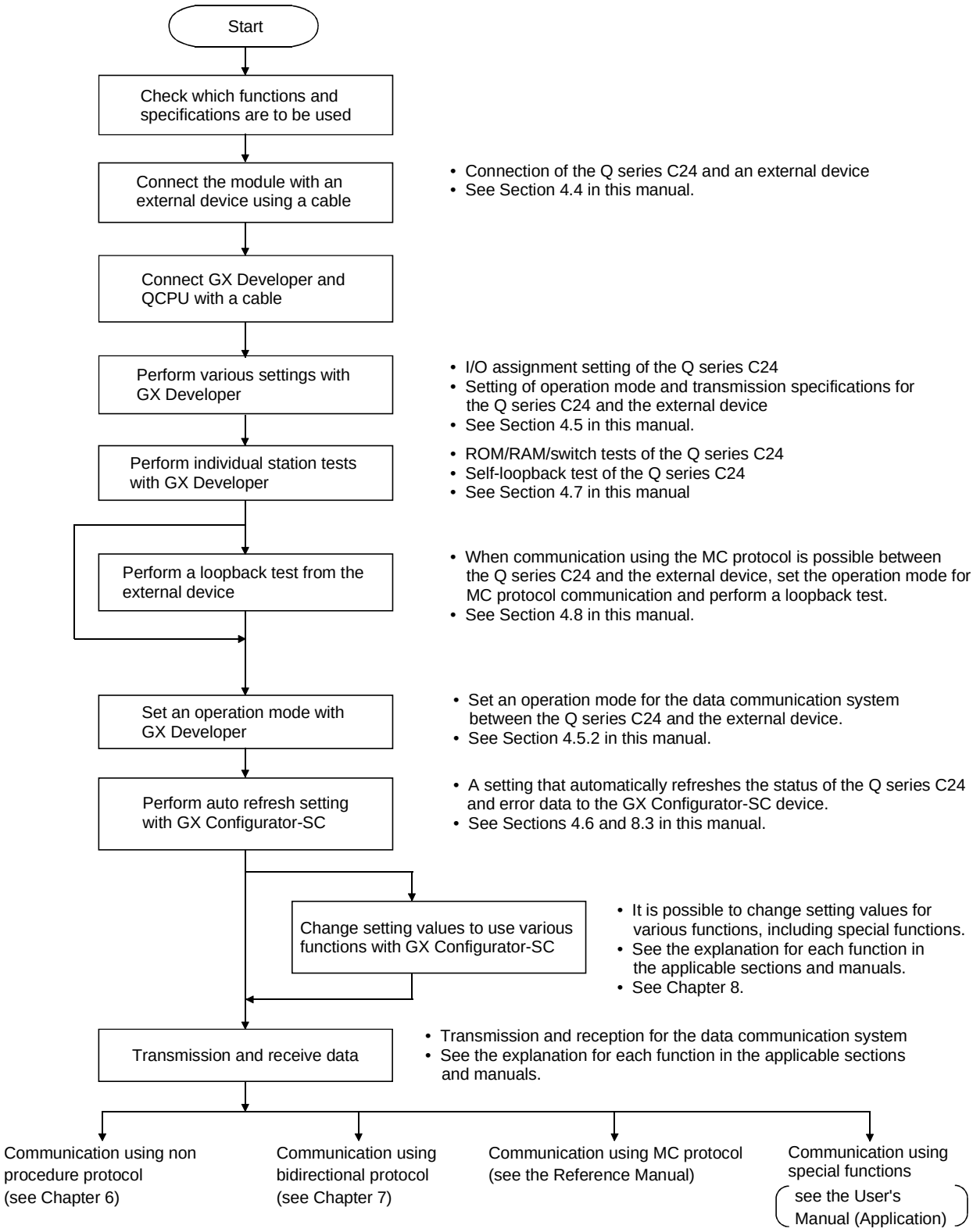
4.2 Settings and Procedures Prior to Operation

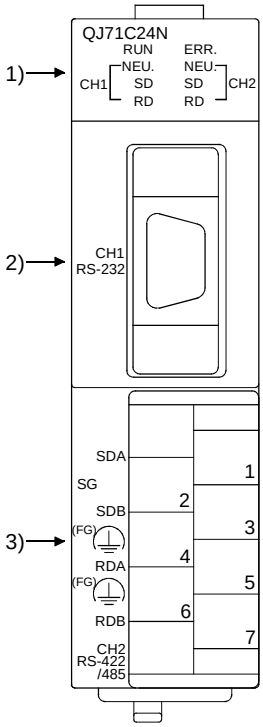
The outline of the procedure before operation is shown below.



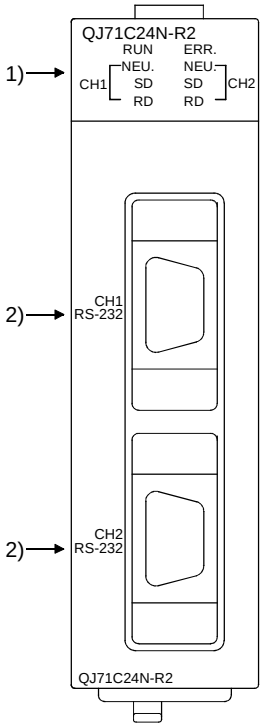
4.3 Part Names and Functions

Part names of Q series C24 are shown below.

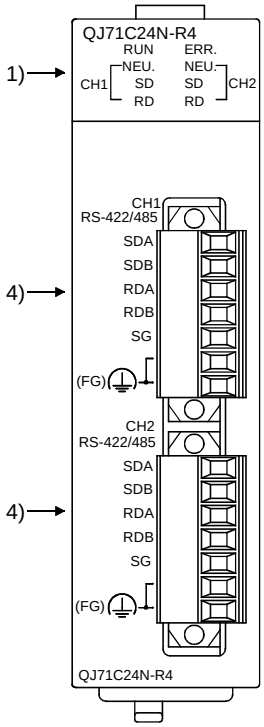
QJ71C24N
QJ71C24 (*1)



QJ71C24N-R2
QJ71C24-R2 (*2)



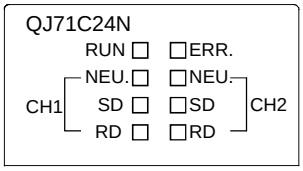
QJ71C24N-R4

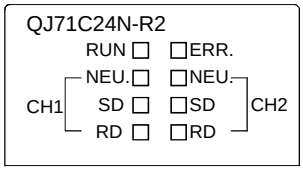


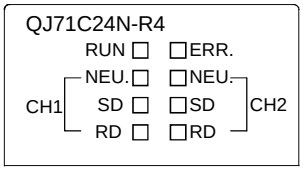
*1 The external diagrams of the QJ71C24 are the same as QJ71C24N (except for the model name).
*2 The external diagrams of the QJ71C24-R2 are the same as QJ71C24N-R2 (except for the model name).

	Name	Contents
1)	Display LED	Display LED (For details, see (1).)
2)	RS-232 interface	RS232 interface for serial communication with external devices (D-Sub 9 pin)
3)	RS-422/485 interface	RS422/485 interface for serial communication with external devices (2-piece terminal block)
4)	RS-422/485 interface	RS422/485 interface for serial communication with external devices (2-piece plug-in socket block)

(1) LED display list







CH	LED	Display contents	On/flashing	Off	Compatible protocol		
					MC	Non-procedural	Bidirectional
—	RUN	Normal operation display	Normal	Faulty or reset	Valid		
	ERR	Error display (＊1)	Error has occurred	Normal			
CH1	NEU (＊3)	Neutral status on the CH1 side display (＊2)	Waiting for MC command message to be received	MC command message being received	Valid	Invalid (Off)	
	SD	Transmission status display	Data being transmitted	Data not transmitted	Valid		
	RD	Reception status display	Data being received	Data not received			
CH2	NEU (＊3)	Neutral status on the CH2 side display (＊2)	Waiting for MC command message to be received	MC command message being received	Valid	Invalid (Off)	
	SD	Transmission status display	Data being transmitted	MC command message not transmitted	Valid		
	RD	Reception status display	Data being received	MC command message not received			

＊1 This LED comes on when an error occurs at Q series C24 hardware or during data communication.
＊2 This LED displays the data communication status via MC protocol. (see chapter 10.)
On: Waiting for the command message to be received from the external device.
Off: Processing the command message received from the external device.
＊3 This LED can be made valid also when "GX Developer connection" (0H) is specified in communication protocol setting.

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4.4 External Wiring

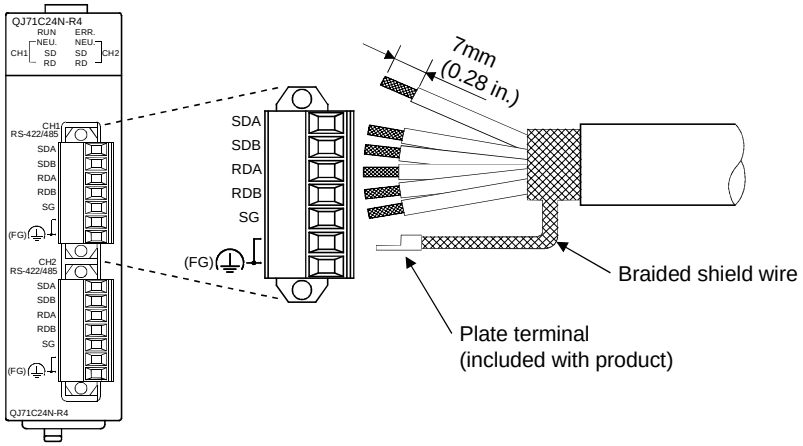
This section explains wiring between the Q series C24 and external device.

As the wiring precautions, external wiring which is resistant to the effects of external noise is a prerequisite for reliable system operation and full use of the Q series C24 function.

(1) Ground the shield at only one point.

(2) When connecting with an external device using an RS-232 line, use a connector shell as specified in Section 3.2.1 on the Q series C24 end.

(3) When connecting with an external device using an RS-422/485 cable, be sure to note the following.
  (a) QJ71C24N and QJ71C24
    1) Use the RS-422/485 cable recommended in section 3.3.2.
    2) The RS-422/485 interface terminal block uses M3 terminal screws. Use suitable crimp-on terminals for the terminals.
  (b) QJ71C24N-R4
    1) Use the RS-422/485 cable recommended in section 3.3.2. Be sure to strip the outer insulation layer by 7 mm before connecting the cable to the plug-in socket block.
    2) When connecting the braided shield wire inside the RS-422/485 cable, use the plate terminals included with the product. The braided shield wire can be connected without the plate terminal. Four plate terminals are included to connect the FG terminals of both stations. (see section 4.4.2.(6).)
    3) When connecting the plug-in socket block to the QJ71C24N-R4, be sure to confirm the layout of the socket block, and then insert it into the RS-422/485 connector on the QJ71C24N-R4.



(4) Connect the external device according to its specifications.

(5) See Appendix 5 for the bend radius of the connection cable.

4.4.1 Connecting the RS-232 interface (full-duplex communications)

The following shows the connection precautions and connection examples when using the Q series C24 RS-232 interface for full-duplex communications.

(1) Connection precautions

(a) For further information about the following items, see the explanation in the applicable section in the User's Manual (Application).

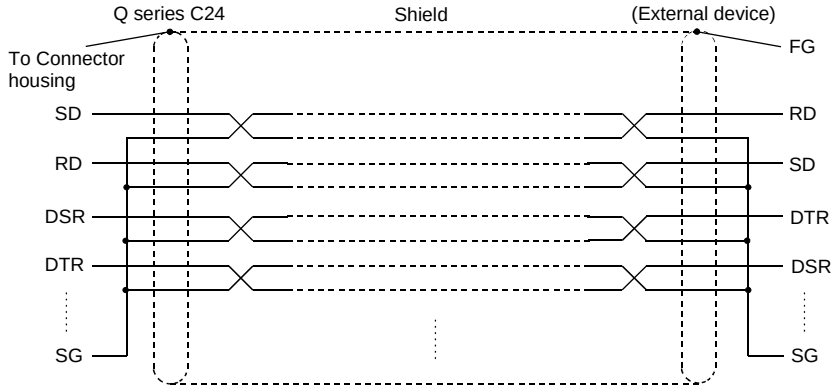
- Controlling the communication on the Q series C24 side by the external device side using the CD signal of the RS-232 interface.
  * This is affected by the "RS-232 CD terminal check setting" in "CHn transmission control and others system setting change" screen on GX Configurator-SC.
- Performing half-duplex communication using specifications on the external device side (an example of such a connection is shown in this section).
- Using modem functions.

(b) The connection cable FG signal and shield are connected as follows.

	Connection on the Q series C24 side	Notes
Connection cable FG signal	Connect to the Q series C24 connector housing	Do not short the communication cable FG signal and the SG signal. When the FG signal and the SG signal are connected inside the external device, do not connect the FG signal to the Q series C24.
Connection cable shield	Connect to the external device FG terminal or the Q series C24 connector housing	

(c) When normal data communication is not obtained due to external noise, perform the wiring as follows:

1) Connect the FG terminals on the external device and the Q series C24 using the shield of the connection cable.
2) Signals other than SG should be connected with SG signals in the twisted pair.

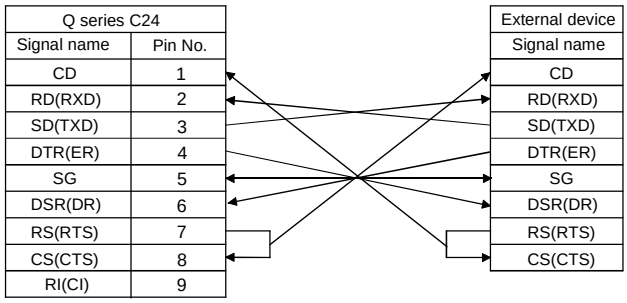


POINT

When using an RS-232 to RS-422 converter to connect the external device and the Q series C24, use a converter that is compatible with the external device and PLC CPU system configuration (1:1).

(2) Connection examples

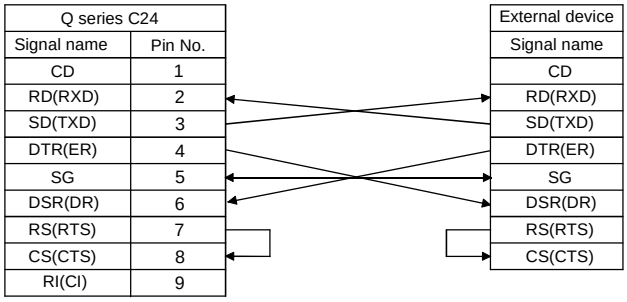
(a) Connection example with an external device capable of turning on and off the CD signal (No. 1 pin)



* The CD terminal check setting is set according to the specification of the external device. When wiring shown above, DTR/DSR control or DC code control may be performed.

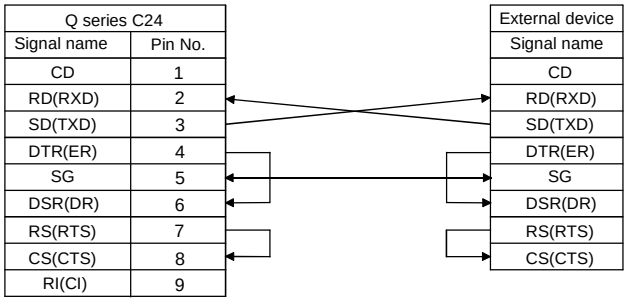
(b) Connection example with an external device not capable of turning on and off the CD signal (No. 1 pin)

1) Connection example 1



* When wiring shown above, DTR/DSR control or DC code control may be performed.

2) Connection example 2



* When wiring shown above, DC code control may be performed.

POINT

If the PLC CPU and an external device cannot be communicated, try to perform data communication as a connection test, using the wiring connection as shown in Connection example 2.
If data can be communicated using the wiring connection shown in Connection example 2, rewire after checking the interface specifications on the external device side.

4.4.2 Connecting the RS-422/485 interface

The following shows the connection precautions and connection examples when using the Q series C24 RS-422/485 interface.

(1) Connection precautions

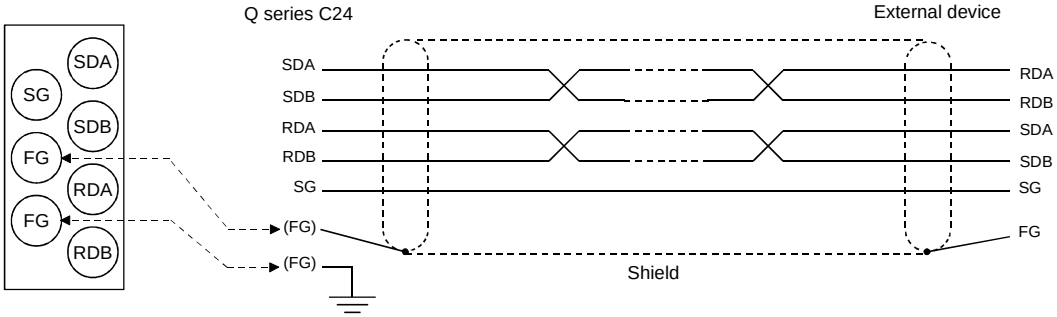
(a) When connecting the Q series C24 SG and FG signals to the external device, connect them according to the specifications of the external device.

(b) Connect the shield of the connection cable to the FG terminal on either of the connected devices.
If normal data communication is not obtained due to external noise even if wiring is made as shown above, perform wiring as follows:

1) Connect between the FG of both stations with the shield of the connection cable.
On the external device side, however, follow the instruction manual of the external device.
Be sure to use the plate terminals included with the product when connecting the braided shield wire to the QJ71C24N-R4.

2) Connect the (FG) of the Q series C24 side to the FG terminal at the power supply module of the station which has the Q series C24 is installed, or to the FG terminal of the control panel on which the Q series C24 PLC is installed.

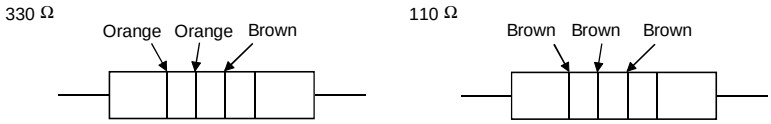
3) Connect nnA and nnB of each signal in the connection cable as a pair.



Correspondance of the RS-422/485 terminal block and signal location.

(c) Terminal resistor must be set (or connected) for the station of both ends on the circuit.
Match the Q series C24 to the specifications of the external device and connect a terminal resistor (packed with the Q series C24) according to this section.
Connect, or set a terminal resistor at the external device according to the instruction manual of the external device.
(The terminal resistor to connect to the Q series C24)
- When communications performed using RS-422, "330 Ω 1/4 W" resistor is connected.
- When communications performed using RS-485, "110 Ω 1/2 W" resistor is connected.

* How to discriminate between the terminating resistors



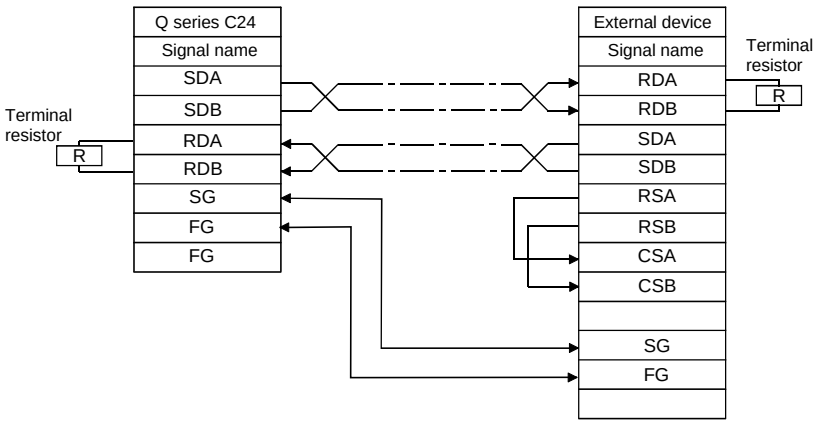
(d) If data cannot be communicated with the external device at all, the polarity of the external device could be wrong and should be checked again. If the polarities of the Q series C24 and the external device do not match, reverse the polarity of each signal on either device side and connect the devices with the cable; this may enable the data to be communicated.

POINT

(1) For terminal resistor setting/connection described in this section, when the RS-232 to RS-422 converters or similar device is used at the external device at both ends of the circuit, a terminal resistor must be set, or connected, at the converter.
(2) When using the RS-232C to RS-422 converters to connect the external devices and the Q series C24, use a converter that is compatible with the external device and PLC CPU system configuration (1:1, 1:n, m:n).
(3) Device connected to the Q series C24 RS-422/485 interface must be standardized as RS-422 or RS-485, including 1:n and m:n connections.

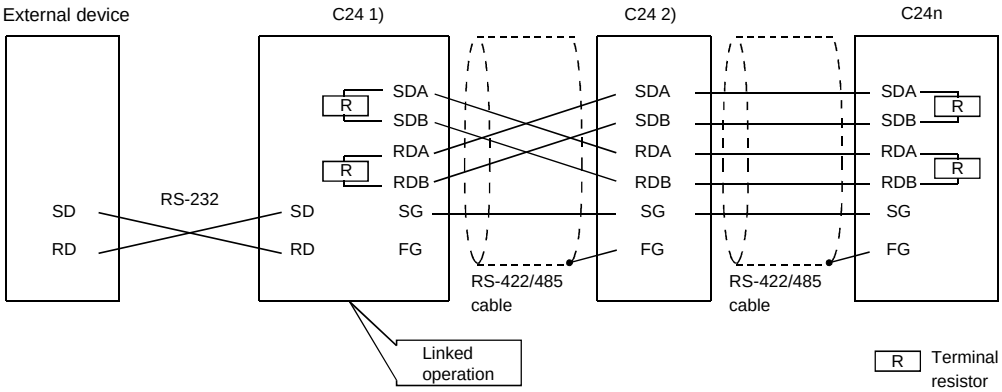
(2) Connection examples

(a) External device and Q series C24 with 1:1 system configuration

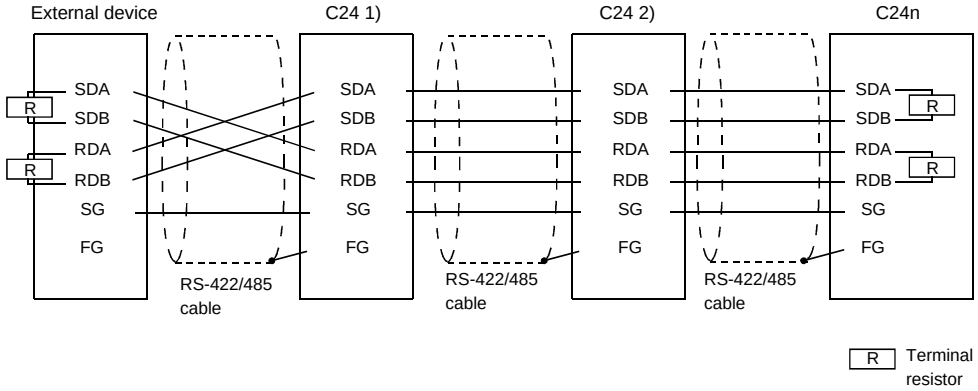


(b) External device and Q series C24 with 1:n (multidrop) system configuration

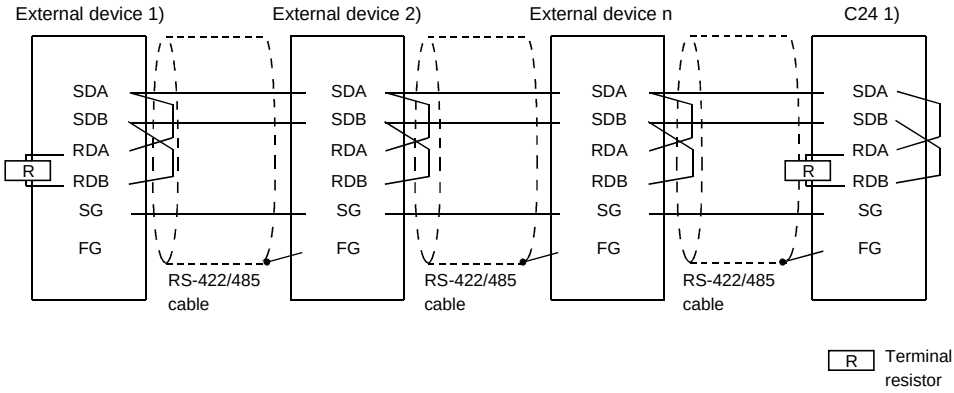
1) Connection example



2) Connection example 2

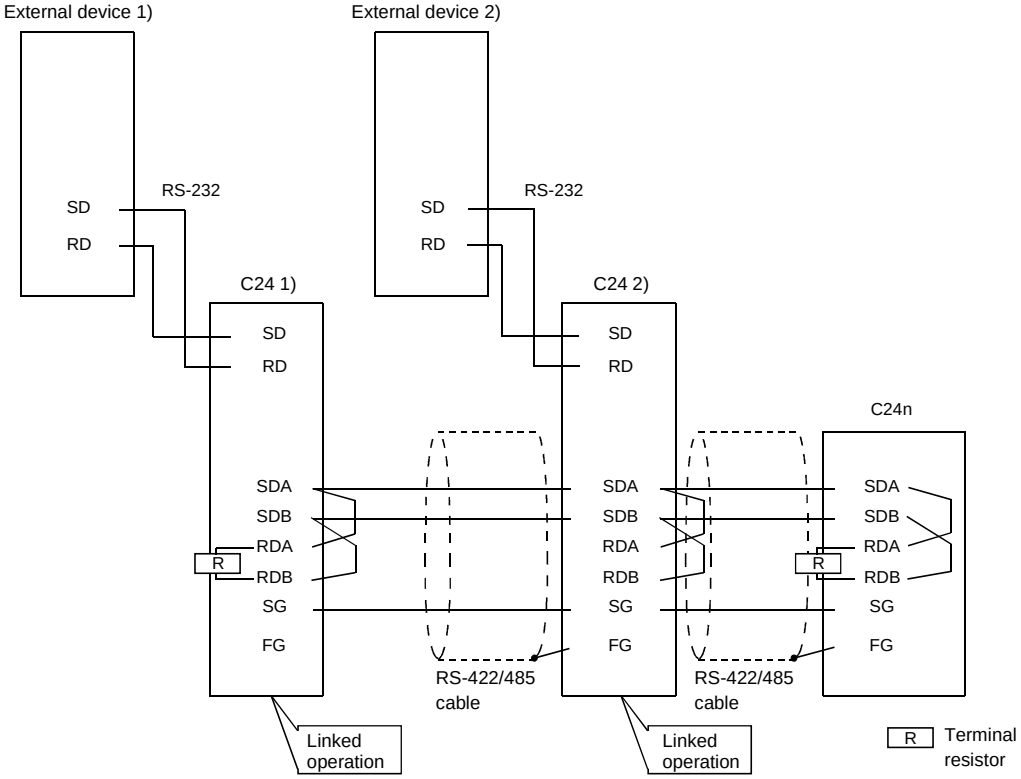


(c) External device and Q series C24 with n:1 (multidrop) system configuration

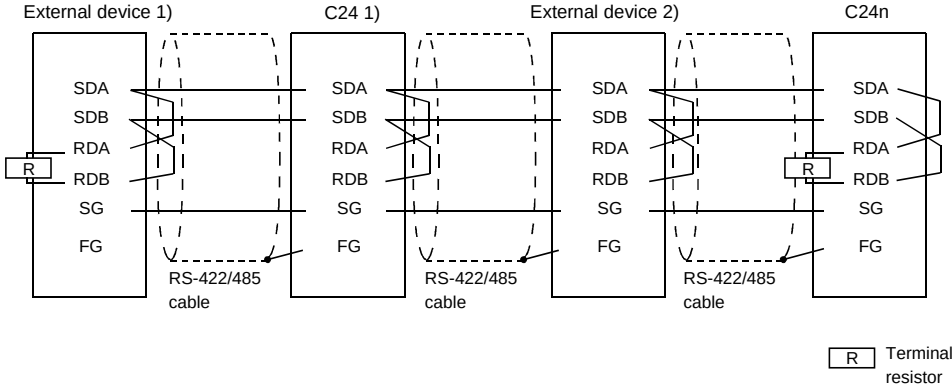


(d) External device and Q series C24 with m:n (multidrop) system configuration

1) Connection example 1



2) Connection example 2



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4.5 Settings for GX Developer

This chapter explains various settings via GX Developer that allow the Q series C24 to perform data communication with external devices.
See Section 3.3.3 of the User's Manual (Application) for how to perform the remote password setting.

4.5.1 I/O assignment settings

[Setting purpose]

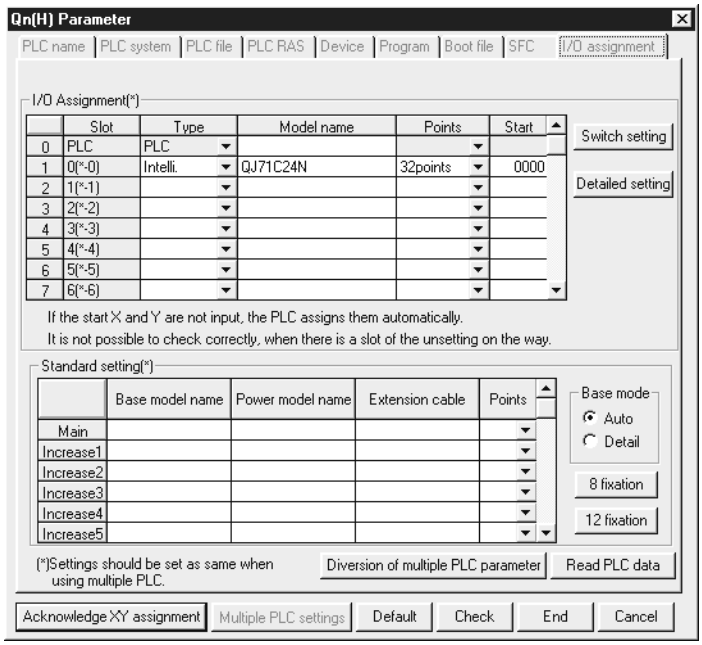
The I/O assignment settings perform the settings for the types of modules to be mounted on a base unit, the range of input/output signals, and switches of the Q series C24.

[Startup procedure]

[GX Developer] → [PLC parameters] → I/O assignment.

For screen display, see the GX Developer Operating Manual.

[Setting screen]



[Display description]

Item name		Setting for item	Remarks
I/O assignment	Type	Select "intelli."	—
	Model name	Enter the module model name to be mounted. (Example: QJ71C24N)	
	Points	Select 32 points.	
	Start XY	Enter the start I/O signal (Hexadecimal) for the target module.	
	Switch setting	Set the communication rate, transmission specifications, communication protocol, etc.	See Section 4.5.2.
	Detailed setting	Select the control PLC of the Q series C24 when a multiple CPU system is employed.	See QCPU User's Manual (Multiple CPU System)
Multiple CPU settings		Select when using a multiple CPU system.	

4.5.2 Switch settings for I/O and intelligent functional module

[Setting purpose]

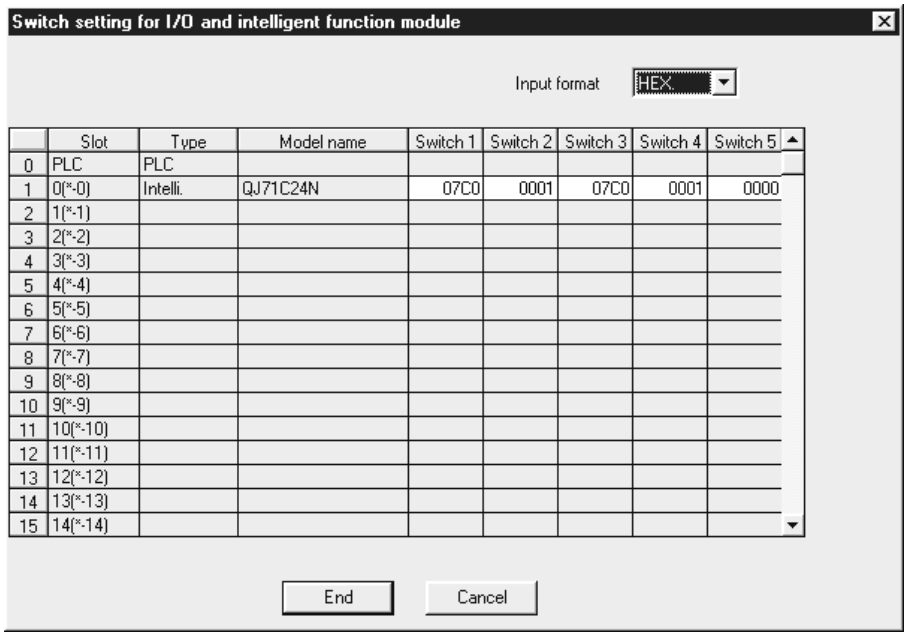
The switch settings for I/O module and intelligent functional module perform the settings for transmission specifications and communication protocol for communicate with external devices.

[Setting procedure]

[GX Developer] → [PLC parameters] → [I/O assignment setting] → Switch setting .

For screen display, see the GX Developer Operating Manual.

[Setting screen]



[Display description]

(1) Switches 1 to 5

Set the transmission specifications and communication protocol of each interface using the combinations of setting values for each switch with 16 bit binary data according to the following table.

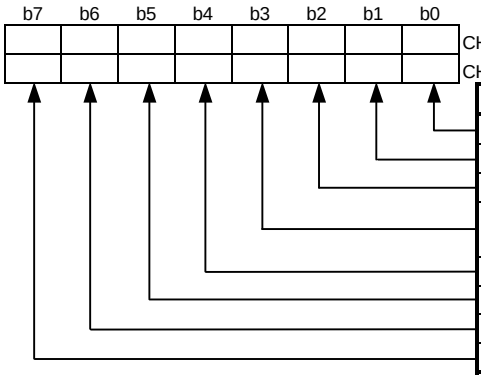
Switch number	Description		Remarks
Switch 1	b15 to b8	b7 to b0	See a) and b)
	CH1 Communication rate setting	CH1 Transmission setting	
Switch 2	CH1 communication protocol setting		See c)
Switch 3	b15 to b8	b7 to b0	See a) and b)
	CH2 Communication rate setting	CH2 Transmission setting	
Switch 4	CH2 Communication protocol setting		See c)
Switch 5	Station number setting		See d)

* For settings to perform linked operation between two Q series C24 interfaces, see (2).

POINT

When GX Developer and/or the GOT is connected directly to the Q series C24, switching settings using GX Developer need not be made to perform access to the QCPU, monitoring and other operations. (If switch settings are not made, operation is performed in the GX Developer connection mode.)

(a) Transmission setting (CH1 side: switch 1 (lower level); CH2 side: switch 3 (lower level))



Bit	Description	OFF (0)	ON (1)	Remarks
b0	Operation setting	Independent	Link	Must be set to OFF on CH1
b1	Data bit	7	8	Parity bit is not included
b2	Parity bit	NO	Yes	Vertical parity
b3	Even/odd parity	Odd	Even	Valid only when parity bit is set to Yes
b4	Stop bit	1	2	—
b5	Sum check code	NO	Yes	—
b6	Write during RUN	Prohibited	Allowed	—
b7	Setting modifications	Prohibited	Allowed	—

* All items listed in the table should be set to OFF for the interfaces for which "GX Developer connection" is set in the communication protocol setting.

If connecting directly to the GX Developer, it operates with the setting value on the GX developer. (Refer to the description below.)

Transmission setting	Setting description for GX Developer
Operation setting	Independent
Data bit	8
Parity bit	Yes
Even/odd parity	Odd
Stop bit	1
Sum check code	Yes
Write during RUN	Allowed
Setting modifications	Allowed/Prohibited

1) Operation setting
   - This sets whether to use each of the two Q series C24 interfaces for independent data communication, or to use the two for linked data communication.
   - The setting and data flow for linked operation is explained in (2).

2) Data bit setting
   - This sets the bit length for one character in data communicated with an external device according to the specifications of the external device. (When data communication is performed using format 5 of the MC protocol (for binary code communication), it is necessary to set it to 8 bits when processing the sum check code with the bidirectional protocol.)
   - If 7 bits are set, the data is communicated by ignoring the most significant bit (8th bit).

3) Parity bit setting
   - This sets whether or not a parity bit (vertical parity) is added for one byte of transmission/receive data, according to the specifications of the external device.
   - The addition of the parity bit to the transmission data and the checking of the parity bit of receive data are performed by the Q series C24.

4) Even/odd parity setting
This sets whether the parity bit (vertical parity) should be odd parity or even parity when adding the parity bit (vertical parity), according to the specifications of the external device.

5) Stop bit setting
This sets the stop bit length for one character in data communicated with an external device, according to the specifications of the external device.

6) Sum check code setting
- This sets according to the specifications of the external device whether or not a sum check code is added to transmission and reception messages of each frame and format during data communication using the MC or bidirectional protocol.
- For an explanation of the message configuration and sum check code when a sum check code is added (set to Yes), see the applicable explanation of each protocol.

7) Write during RUN setting
- This sets according to the system specifications whether or not data transmitted using the MC protocol is written to the PLC CPU from an external device while the PLC CPU is running.
- When write during RUN is prohibited (disabled), the data is not written and an NAK message is returned if the external device requests the PLC CPU to write data while it is running.
- For an explanation of the functions available in this setting, check in the "write allowed setting" and "write prohibited setting" columns in the command list of the Reference Manual.

8) Setting modifications setting
This sets whether or not the following actions are allowed after starting up the Q series C24.
Changing data communication functions and transmission
- Specifications, and the switching mode of each interface
- Writing data to the flash ROM (writing the system setting values and user frame)

POINT

(1) A setting change in the connected interface side should be set to Allowed, in order to register a user frame to the flash ROM from an external device using the MC protocol.

(2) Setting changes in interfaces on the CH1 and CH2 sides should both be set to Allowed, in order to register the system setting values and user frames to the flash ROM from the PLC CPU.

(b) Communication rate setting (CH1 side: switch 1 (upper level); CH2 side: switch 3 (upper level)) ∗1 ∗2 ∗3

Communication rate (Unit: bps)	Bit position b15 to b8	Communication rate (Unit: bps)	Bit position b15 to b8	Remarks
50	$0F_H$	14400	06_H	Try lowering the communication rate when data cannot be communicated normally with an external device due to overrun errors and framing errors etc.
300	00_H	19200	07_H	
600	01_H	28800	08_H	
1200	02_H	38400	09_H	
2400	03_H	57600	$0A_H$	
4800	04_H	115200	$0B_H$	
9600	05_H	230400	$0C_H$	

∗1 Transmission speed of 230,400 bps is available for only CH1 of the QJ71C24N (-R2/R4).

∗2 When connecting external devices to both of two interfaces, the total of the communication speed should be 115,200bps or less (230,400 bps or less if using QJ71C24N (-R2/R4)). When connecting an external device to either of two interfaces, the maximum of 115,200 bps is available for the interface (the maximum of 230,400 bps if using QJ71C24N (-R2/R4)). In this case, set 300 bps for the other interface to which no external device is connected.

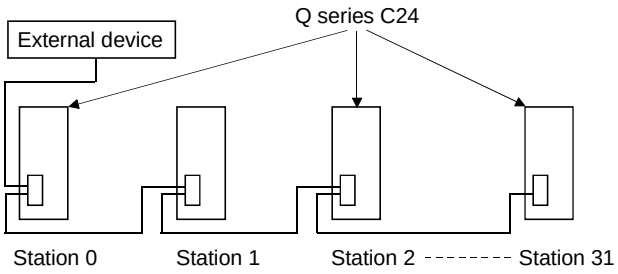
∗3 Set "00_H" to the interface for which "GX Developer connection" is set in the communication protocol setting. Serial communication module will operate at the communication speed set on the GX Developer.

(c) Communication protocol setting (CH1 side: switch 2; CH2 side: switch 4)

Set number	Description		Remarks
0_H	GX Developer connection		GX Developer communication rate and transmission specifications are automatically set.
1_H	MC protocol	Format 1	For communication with ASCII code in the specified form of an A compatible 1C frame or QnA compatible 2C/3C/4C frame
2_H		Format 2	
3_H		Format 3	
4_H		Format 4	
5_H		Format 5	For communication with binary code in a QnA compatible 4C frame
6_H	Non procedure protocol		For communication using non procedure protocol
7_H	Bidirectional protocol		For communication using bidirectional protocol
8_H	For linked operation setting		Set to the CH1 side when CH1 and CH2 interfaces are used in linked operation (operated with the communication protocol of the CH2 side).
9_H to D_H	Setting prohibited		—
E_H	ROM/RAM/switch test		For self-diagnosis of the modules
F_H	Individual station loopback test		For checking operation of each interface of the modules

(d) Station number setting (switch 5 (common for both CH1 and CH2 sides))

- This setting is for communication using the MC protocol.
- When several the Q series C24s are connected on the same line with multidrop connection, set the station number designated in the data items of the transmission frame in each external device to 0 to 31 (0_H to $1F_H$).
  ✻ This number designates which external device is to be communicated with the Q series C24.
- Set the station number to 0 when the system configuration of the external device and the PLC CPU is 1:1.



POINT

If the communication of data with external device is to be started, check the specifications of the functions to be used and then make the settings and connect the cables.
Make the following switch settings from the GX Developer if there is to be no communication (if the cables are not to be connected) at the interface.

- Communication protocol setting : Set between 0_H and 7_H.
- Transmission setting, communication rate setting: Set all to OFF.

(2) The setting and data flow in linked operation

(a) Set the related switches as follows when two Q series C24 interfaces are in linked operation.

Switch number		Settings		Setting value
Switch 1	CH1 side	Transmission setting	Operation setting	b0 = OFF
			Data bit setting	Set each switch on both CH1 and CH2 sides to the same specification.
			:	
		Communication rate setting		Match the external device.
Switch 2		Communication protocol setting		8
Switch 3	CH2 side	Transmission setting	Operation setting	b0 = ON
			Data bit setting	Set each switch on both CH1 and CH2 sides to the same specification.
			:	
		Communication rate setting		Match the external device.
Switch 4		Communication protocol setting		0 to 7
Switch 5		Station number setting		Set according to (d) of (1)

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(b) Do not use the above settings for the following cases, because linked operation cannot be performed.

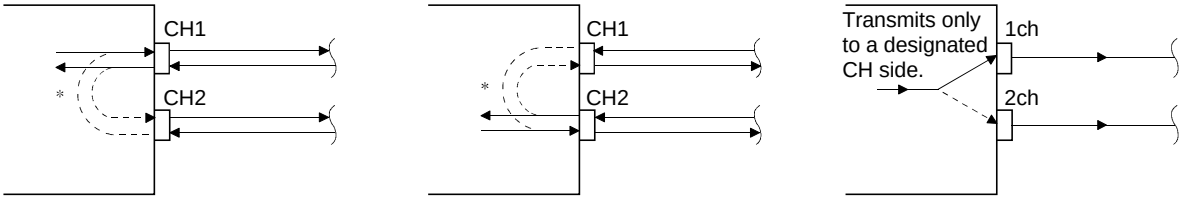
1) When using the QJ71C24N-R2 or QJ71C24-R2.
2) When an external device is not connected to either of the interfaces.
3) When the bidirectional protocol is used for data communication.
4) When communicating data with an external device connected to two interfaces that are not interacting, using functions set in the communication protocol settings (MC protocol/non procedure protocol).
5) When communicating data using the modem function.

POINT
When two interfaces are in linked operation, the transmission time for one character becomes equal to the hardware gate off time of the Q series C24.

(c) The data flow in linked operation is as follows.

1) Two interfaces operate linked together using functions defined with the communication protocol setting on the CH2 side (MC protocol in the same format or a non procedure protocol) within the transmission specifications set in the respective transmission settings (specifications for CH1 and CH2 must be the same).

Q series C24 (data flow in linked operation)



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* In linked operation, all data received from one of the two interfaces is transmitted from the other interface. In this case, exclusive control of the received data is necessary when data is communicated using the non-procedure protocol since all the connected stations receive the data. When data communication is performed using the MC protocol, only the Q series C24 having the station number designated in the message performs the process designated by the command. Furthermore, when data communication is performed using QnA compatible 2C/3C/4C frames of the MC protocol, the header information for linked operation is added to messages directed to other stations linked by multidrop connection.

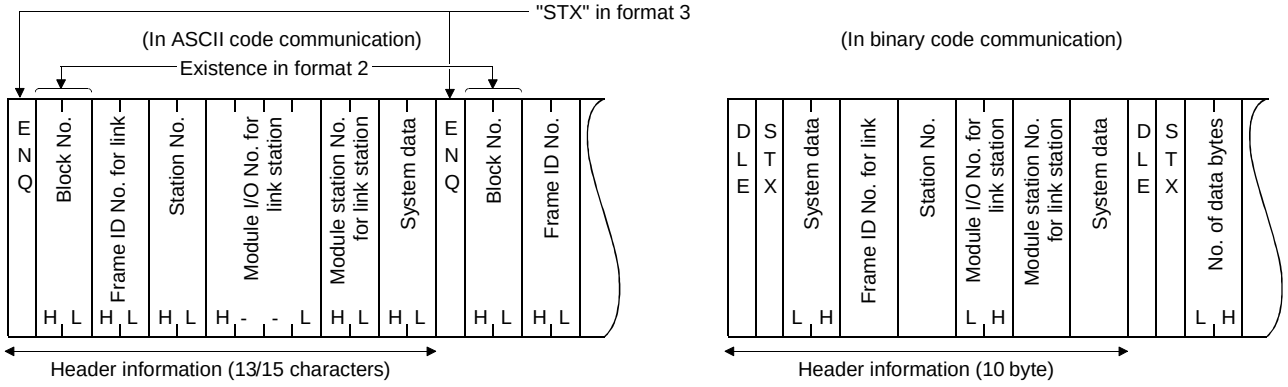
  ⓐ Processing performed by the Q series C24 connected to an external device
  - The header information is added to the command messages received from the external device that are directed to other stations and sends them to the stations through the other interface.
  - The header information is deleted from the response messages received from other stations and sends them to the external device using the other interface.
    (The header information is also sent during m:n connection.)

  ⓑ Operation of the accessed station
  The accessed station processes the request contained in the command message, adds the header information to a response message, and sends it using the interface that received the command message.

REMARK

The following describes the header information that is added by the Q series C24 to a message in linked operation.

1) When communicating with ASCII code (formats 1 to 4)
   The following 13/15 character header information is added immediately before the control code (ENQ/STX/ACK/NAK) at the start of each message (13 characters for formats 1, 3 and 4; 15 characters for format 2).
2) When communicating in binary mode (format 5)
   The following 10 byte header information is added immediately before the control code (DLE + STX) at the start of each message.



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4.5.3 The Intelligent function module interrupt pointer setting

The following explains the interrupt pointer setting with GX Developer in order to receive data using an interrupt program.
For the method to receive data using an interrupt program, see User's Manual (Applications) Chapter 4.

[Setting purpose]

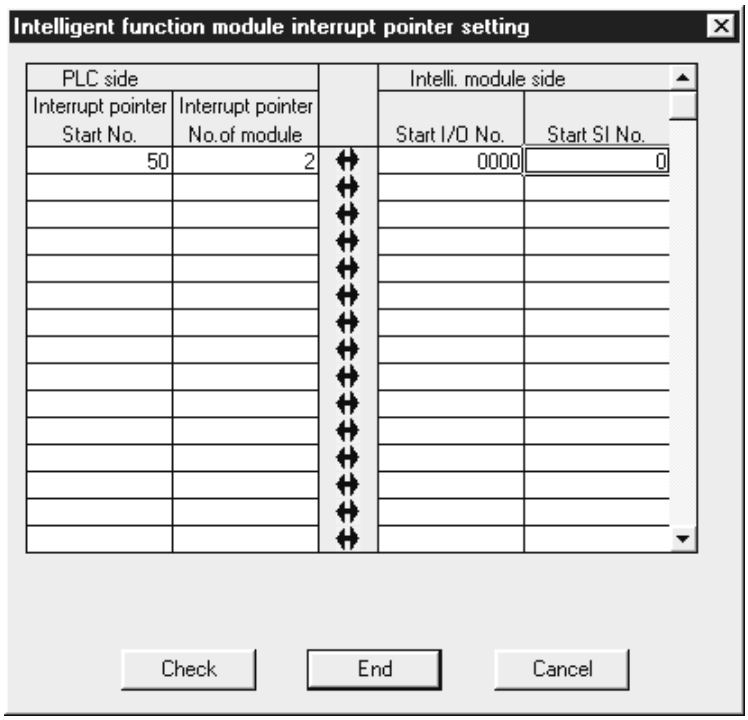
The intelligent function module interrupt pointer sets the information to read the receive data with an interrupt program of the PLC CPU during communication using the non procedural/bidirectional protocol.
By performing this setting, an interrupt program starts when data is received from an external communicating device and the reading of data received by the PLC CPU becomes possible.

[Startup procedure]

[PLC parameters] → [PLC system setting] → Interrupt pointer setting .

For display screen, see the GX Developer Operating Manual.

[Setting screen]



[Setting description]

(1) Interrupt pointer start No. on the PLC side
Set the start number (ranging from 50 to 255) of the interrupt pointer (Ixx) for use in the sequence program.

(2) Interrupt pointer No. of units on the PLC side
Set the number of units (2) of interrupt pointers (I) for use in the sequence program.

(3) Start I/O No. on the intelligent module (unit) side
Set the start I/O No. for the Q series C24.

(4) Start SI No. on intelligent module (unit) side

1) Assign control numbers (SI) on the Q series C24 side to the interrupt pointers (Ixx) used in the sequence program.
2) Set the start SI No. (0) of the interrupt control numbers.
3) The interfaces for data reception corresponding to the interrupt control numbers are as follows:
SI No. 0: for interface on the CH1 side
SI No. 1: for interface on the CH2 side

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4.6 Settings with the Utility Package (GX Configurator-SC)

The settings defined with GX Configurator-SC for operation of the Q series C24 are described in Chapter 8.
The following concerns the data set from GX Configurator-SC.

1) Data set in the Q series C24 for the use of specific functions
2) Data set in the PLC CPU to communicate information between the Q series C24 and the PLC CPU of the mounting station.

This section explains the "Auto refresh settings" of the data mentioned in 2) above.

[Setting purpose]

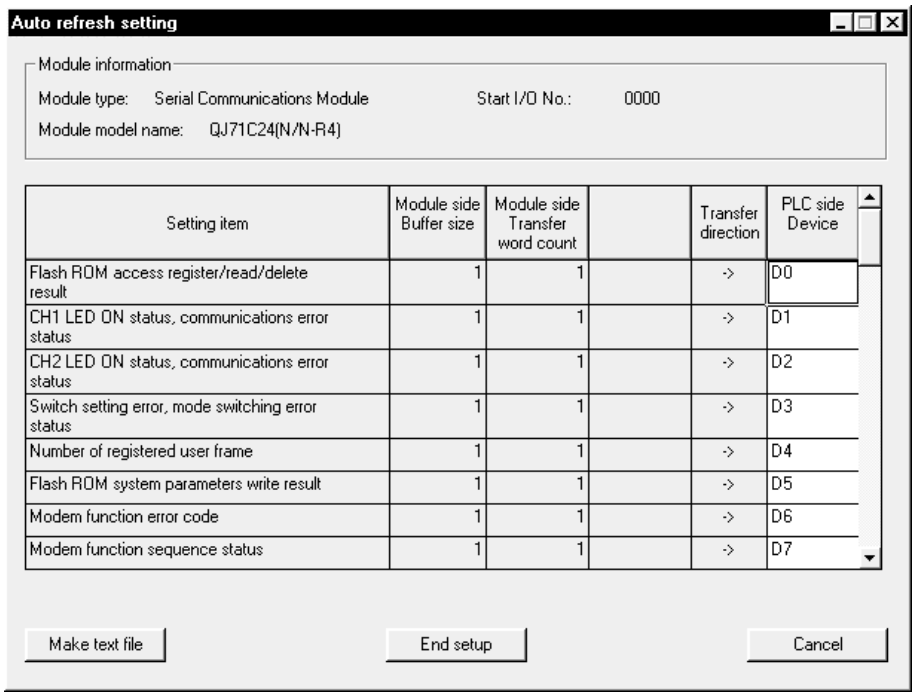
The auto refresh settings are defined to automatically store the error and status information stored in the buffer memory of the Q series C24 in devices designated by the PLC CPU.
By this setting, the users can see the module error and status information without accessing the Q series C24.

[Setup procedure]

[GX Developer] → [Tools] → [Intelligent function utility] → [Start] → "Intelligent function module parameter setting module select"→ Auto refresh .

For display screen, see Section 8.3.

[Setting screen]



[Setting items]

Setting item		Buffer memory address	Reference section
Flash ROM access register/read/delete result		4H	Section 8.6.9 Section 10.1
CH1/CH2 LED ON status, communication error status (*1)		201H /202H	
Switch setting error, mode switching error status (*1)		203H	
Number of registered user frame		204H	
Flash ROM system parameters write result		220H	
Modem function error code		221H	Section 8.6.2 Section 3.3 of User's Manual (Application)
Modem function sequence status		222H	
Number of data registrations for connection		223H	
Number of data registrations for initialization		226H	
Number of notification execution		229H	
Data storage area 1 notification execution data No.		22AH	
Data storage area 2 notification execution data No.		22EH	
Data storage area 3 notification execution data No.		232H	
Data storage area 4 notification execution data No.		236H	
Data storage area 5 notification execution data No.		23AH	
Accumulated count of unlock process normal completion		22FBH	
Accumulated count of unlock process abnormal completion		22FCH	
Accumulated count of lock process based on circuit disconnection		22FFH	
CH1/CH2 communication protocol status (*1)		252H/262H	Section 4.5.2 Section 8.6.3 Section 10.1
Transmission status (*1)		253H/263H	
RS-232 control signal status (*1)		254H/264H	
Transmission sequence status (*1)		255H/265H	Sections 8.6.4 to 8.6.6 Section 10.1
On-demand execution result		256H/266H	
Data transmission result		257H/267H	
Data reception result		258H/268H	
MC protocol transmission error code		25AH/26AH	
Receive user frame nth		25BH/26BH	Section 8.6.5 Chapter 11 of User's Manual (Application)
User frame being transmitted		B6H/156H	
PLC CPU monitoring function	Operation status	2204H/2304H	Section 8.6.7 Chapter 2 of User's Manual (Application)
	Execution result	2205H/2305H	
	Number of transmission	2206H/2306H	
Monitoring condition arrival block No.		2207H/2307H	

*1 See Section 10.1 for the contents of the buffer memory.

(1) Devices

(a) Set the word device of the PLC CPU which stores error and status information in the setting item field when using the auto refresh function between the Q series C24 and the PLC CPU.

(b) The devices used must be of the types X, Y, M, L, B, T, C, ST, D, W, R, or ZR.

* If bit devices of types X, Y, M, L, or B are used, a number that can be divided by 16 points (e.g., X30, Y120, M16, etc.) should be specified. The buffer memory data is stored in 16 point units from the specified device number (e.g., if M16 is set, data is stored from M16 to M31).

(c) The device can be set to auto refresh for required information only.

(2) Writing auto refresh settings to QCPU and saving them in a file

(a) Writing auto refresh settings to QCPU
Use online PLC write function of GX Configurator-SC or GX Developer.

(b) Saving in a file
Use the file storage function shown in the file items in the parameter module selection screen shown in Section 8.3.2. of GX Configurator-SC.

POINT

(1) The auto refresh settings are stored in the intelligent function module parameter.
After the intelligent function module parameters have been written to the CPU module, it enables the auto refresh setting by turning the power OFF → ON or by resetting the CPU module.

(2) The auto refresh settings cannot be changed from the sequence program. However it is possible to add a process similar to auto refresh by using the FROM/TO command of the sequence program.

4.7 Individual Station Test

After installing the Q series C24 to the base unit of QCPU, perform an individual station test first to check the switch setting (see Section 4.5.2) and operation of the Q series C24.

POINT

(1) When a problem occurs during data communication with an external device, perform an individual station test as described in this section to check whether or not there is any problem in the operation of the Q series C24.

(2) In order to avoid problems, set the PLC CPU to STOP status during the individual station test.

(3) Test both interfaces of the Q series C24 simultaneously in an individual station test. Alternatively, either one of the interfaces can be tested in an individual station loopback test.
In that case, ignore the test results on the interface side for which the test is not performed.

(4) Cable removal and reconnection before and after the individual station loopback test should be performed with the power to the Q series C24 mounting station turned off.

(5) To restart data communication with an external device after an individual station test, check the specifications of the devices used before defining various settings and reconnecting cables.
For the interface that is not used for communication (no cable connection), define the switch settings in GX Developer as follows (for the setting method, see Section 4.5.2).
- Communication protocol setting: 0_H to 7_H
- Transmission control settings and communication rate settings: all set to OFF.

(6) If an error occurs even though the correct settings have been made for the Q series C24 through an individual station test, please consult your nearest dealer or branch office with a description of the error.

4.7.1 ROM/RAM/switch tests

A ROM/RAM/switch test checks the contents of the memory of the Q series C24 and the switch settings set with GX Developer.
Perform a ROM/RAM/switch test with the procedure described below.

(Procedure 1) Communication protocol setting and transmission setting (see Section 4.5.2)

(1) Set the communication protocol setting on the CH2 side to E_H (ROM/RAM/switch test). Set the communication protocol setting on the CH1 side to the number (1 to 8) used for data communication with an external device following the test.

(2) Set the transmission settings for the two interfaces to match the specifications used when communicating data with an external device.

(Procedure 2) Performing ROM/RAM/switch tests

(1) Set the PLC CPU to STOP status.

(2) Restart the PLC CPU station or reset the CPU. The test starts automatically in about one second.

(3) For the Q series C24, the following tests should be performed once.

1) ROM check
Read the ROM data and verify the sum check.

2) RAM check
Write data to RAM, and read and check it.

3) Switch check
Check whether or not each switch is set within the tolerance range and the operation setting in the transmission settings is set to off.

4) Linked operation setting check (perform this test with the operation setting in the transmission settings of CH2 set to on)
Check to see that the communication protocol setting on CH1 is set to 8H and whether the communication rate setting of each channel is within the tolerance range.

＊ A linked operation setting check is performed when values are set as follows:
- Communication protocol setting on the CH1 side : 8H
- Operation setting in the transmission settings on the CH2 side: bit 8 = ON.

(Procedure 3) Checking results of ROM/RAM/switch tests

(1) The test is completed when the NEU LED on CH1 side is lit (approximately 2 seconds).

(2) The test is completed normally when the ERR LED turns off.

(3) The test is completed with error when the ERR LED turns on. Check the error description in one of the following screens.
- The "Monitor/test others" screen of GX Configurator-SC (see Section 8.6.9)
- The buffer memory monitor screen of GX Developer (see the GX Developer Manual for the operation method)

＊ When checking errors in the buffer memory monitor screen of GX Developer, monitor the following buffer memory.

Check the error descriptions on the screens by bit-decoding the monitored value (16-bit integer). Each bit corresponds to the following error description.

<table>
<tr><th colspan="4">Buffer memory monitored</th><th colspan="2" rowspan="2">Description when corresponding bit is on</th><th rowspan="2">Corrective action</th></tr>
<tr><th>Address
Bit location</th><th>CH1 side
201H</th><th>CH2 side
202H</th><th>CH1/CH2 side
203H</th></tr>
<tr><td>b0</td><td colspan="2">—</td><td>—</td><td colspan="2">—</td><td rowspan="5">Review setting value
(see Section 4.5.2)</td></tr>
<tr><td>b1</td><td colspan="2">SIO</td><td>—</td><td rowspan="2">When linked operation setting</td><td>Transmission setting error</td></tr>
<tr><td>b2</td><td colspan="2">PRO</td><td>—</td><td>Protocol setting error</td></tr>
<tr><td>b3</td><td colspan="2">P/S</td><td>—</td><td rowspan="2">When independent operation setting</td><td>Transmission setting error</td></tr>
<tr><td>b4</td><td colspan="2">C/N</td><td>—</td><td>Protocol setting error</td></tr>
<tr><td>b5 to b6</td><td colspan="2">—</td><td>—</td><td colspan="2">—</td><td>—</td></tr>
<tr><td>b7</td><td>NEU</td><td>—</td><td></td><td colspan="2">Test completed</td><td>—</td></tr>
<tr><td>b8 to b13</td><td colspan="3">—</td><td colspan="2">—</td><td>—</td></tr>
<tr><td rowspan="2">b14</td><td rowspan="3">—</td><td>CH2 ERR</td><td>—</td><td colspan="2">RAM error</td><td>(＊1)</td></tr>
<tr><td>—</td><td>Setting station number</td><td colspan="2">Out of the setting station number range</td><td>Review setting value
(see Section 4.5.2)</td></tr>
<tr><td>b15</td><td>CH1 ERR</td><td>—</td><td colspan="2">ROM error</td><td>(＊1)</td></tr>
</table>

＊1 Consult your nearest dealer.

(Procedure 4) Ending a ROM/RAM/switch test

(1) Perform the following procedures after checking normal completion/abnormal completion of the test results.
Normal completion : Perform operation (2) to finish tests.
Upon error occurrence : When an error occurs in a switch check or linked operation setting check, set the correct values and test again.
When an error occurs in a ROM or RAM check, check the mounting status of module and test again.
If there is no error in the mounting status of module, consult your nearest dealer or branch office.

(2) Perform the ending procedure for ROM/RAM/switch test

1) Follow the procedure in Section 4.7.2 to perform an individual loopback test operation.
2) Perform the following procedure to end the test and start data communication with an external device.
- Set the switch settings on GX Developer according to the procedure specified in Section 4.5.2.
- Turn off the power to the station on which the Q series C24 is installed and connect the communication cable with an external device.
- Turn on the power to the station on which the Q series C24 is installed.

4.7.2 Individual station loopback test

The individual station loopback test checks the operation of the communication function of the Q series C24.
Follow the procedure below to perform an individual station loopback test.

(Procedure 1) Connecting cable

(1) Connect cables to two interfaces as follows.
- Connect cables to the RS-232 interface within the connector and install it to the interface.
- Connect cables to the RS-422/485 interface on a terminal block.

RS-232 interface (D-Sub 9 pin)

Q series C24 side		Cable connection
Signal name	Pin number	
CD	1	
RD (RXD)	2	
SD (TXD)	3	
ER (DTR)	4	
SG	5	
DR (DSR)	6	
RS (RTS)	7	
CS (CTS)	8	
RI (CI)	9	

RS-422/485 interface

Q series C24 side	Cable connection
Signal name	
SDA	
SDB	
RDA	
RDB	
SG	
FG	
FG	

(Procedure 2) Communication protocol setting and transmission setting (see Section 4.5.2)

(1) Set the communication protocol setting to FH (individual station loopback test) for both interfaces.

(2) Set each transmission setting of the two interfaces according to the transmission specification for data communication with an external device.

(Procedure 3) Performing the individual station loopback test

(1) Set the PLC CPU to STOP status.

(2) Restart the PLC CPU station or reset the CPU. The test starts automatically in about one second.

(3) For the Q series C24, perform the following tests in sequence and repeat them (one test cycle takes approximately one second).
* End testing when all test results become abnormal.
  1) Check communication with the PLC CPU
     Read and check the model type of the PLC CPU.
  2) Check transmission and reception functions of the interface
     Perform communication while changing data.

(4) The LED corresponding to a test item flashes when the test starts.
- The CH1 NEU LEDs flash when checking communication with the PLC CPU.
- The SD and RD LEDs of the interface being tested flash when checking the communication functions of each interface.

(Procedure 4) Checking the results of an individual loopback test

(1) This test is performed repeatedly. When the ERR LED is off, the test is being executed normally.

(2) The test is completed with an error when the ERR LED is lit. Check the error description on one of the following screens. (The ERR LED is lit upon error occurrence, and the test is completed.)
- The "Monitor/test others" screen of GX Configurator-SC (see Section 8.6.9)
- The buffer memory monitor screen of GX Developer (see the GX Developer Manual for operation method)

  ∗ When checking for errors in the buffer memory monitor screen of GX Developer, monitor the LED ON status storage area (address CH1: 201H, CH2: 202H).

Check the error descriptions on the screens by bit-decoding the monitored value (16-bit integer). Each bit corresponds to the following error description.

Buffer memory monitored: Address / Bit location	CH1 side 201H	CH2 side 202H	Description when corresponding bit is on	Corrective action
b0 to b3	—		—	—
b4	C/N	—	Error occurrence in the CPU module.	Remove errors occurring in the CPU module.
			Not enough power supply capacity.	Examine the power supply capacity.
			Module is not mounted correctly.	Reinstall the module properly.
			Error occurrence in the base unit, extension cable, CPU module, or the Q series C24.	Check each module and remove the cause of the error. Reconnect the cable correctly. Reinstall the module correctly.
b5 to b13	—		—	—
b14	—	CH2 ERR	CH2 side communication error	Reconnect the cable correctly. Examine the test wiring connection.
b15		CH1 ERR	CH1 side communication error	

(Procedure 5) Ending individual station loopback test

(1) Perform the following procedures after checking normal completion/abnormal completion of the test result.
Normal completion : Perform operation (2) to finish the test.
Upon error occurrence : Remove the cause of the error according to the corrective action specified in the table above, and test again.

(2) Perform the ending procedure for individual station loopback test

1) Follow the procedure in Section 4.7.1 to perform a ROM/RAM/switch test.
2) Perform the following procedure to end the test and start data communication with an external device.
   - Set the switch settings on GX Developer according to the procedure specified in Section 4.5.2.
   - Turn off the power to the station on which the Q series C24 is installed and connect the communication cable with the external device.
   - Turn on the power to the station on which the Q series C24 is installed.

4.8 Loopback Test

A loopback test performs a communication test using the loopback test function of the MC protocol, in order to check the connection between the Q series C24 and an external device, the communication function of each device, and the operation of the communication program of the external device.

(Procedure 1) Connecting the Q series C24 to an external device

Turn off the power to the station on which the Q series C24 is installed and connect a communication cable to an external device to perform data communication using the MC protocol (see Section 4.4).

(Procedure 2) Switch setting with GX Developer

(1) Set the switch settings with GX Developer as shown in Section 4.5 and write the parameters to the PLC CPU in order to perform data communication using the MC protocol.

(2) The following shows an example of the settings when performing a loopback test on the interface on the CH1 side.

• Switch 1: 0544H	Transmission setting	Operation setting	: Independent operation
		Data bit	: 7 bit
		Parity bit	: Yes (odd)
		Stop bit	: 1 bit
		Sum check code	: No
		Write during RUN	: Allowed
		Setting modification	: Prohibited
	Communication rate setting		: 9600 bps
• Switch 2: 0001H	Communication protocol setting		: MC protocol (format 1)
• Switch 3: 0000H			
• Switch 4: 0000H			
• Switch 5: 0000H	Station number setting		: 0 station

(Procedure 3) Performing a loopback test

(1) Set the PLC CPU to STOP status, and turn the power on or reset the CPU (communication is enabled in about one second).

(2) Create a program for a loopback test on the external device side and send a command message like the one in the example below to the Q series C24.
The commands used are as follows:
- When performing communication test in an A compatible 1C frame: TT command (for an example, see the following page)
- When performing communication test in a QnA compatible frame: 0619 command

✻ See the Reference Manual when performing communication tests in a QnA compatible frame.

(Procedure 4) Checking loopback test result

(1) The Q series C24 sends a response message to the external device when it receives a loopback test command message.

✻ The Q series C24 sends the external device the received data as is.

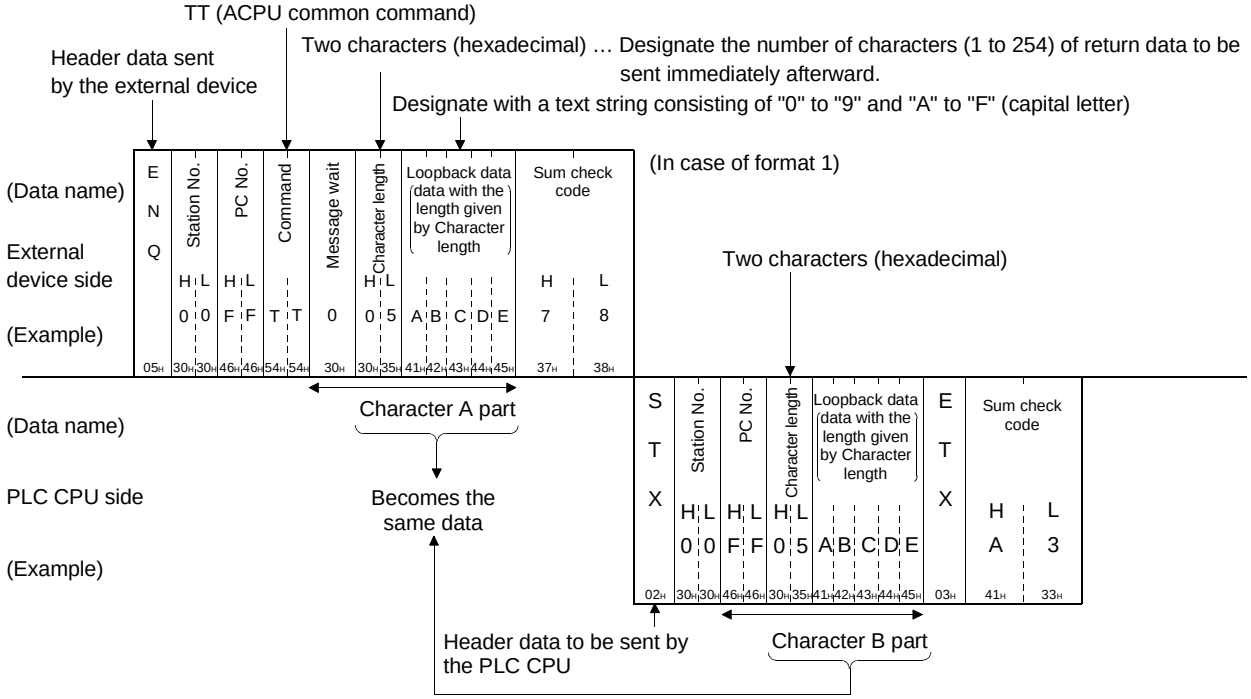
(2) Check on the external device whether the data received from the Q series C24 matches the data sent from the external device.

(Procedure 5) Ending the loopback test

Perform the following procedure according to the function used, and start data communication.

- Set the switch settings with GX Developer according to the procedure specified in Section 4.5.2.
- Turn on the power to the station on which the Q series C24 is installed.

* An example control procedure when the TT command is used in the loopback test mentioned in Procedure 3.
  (Station number: 00, sum check code: Yes)



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4.9 Maintenance and Inspection

This section explains the maintenance and inspection and installing and removing of the Q series C24.

4.9.1 Maintenance and inspection

The Q series C24 has no special inspection items other than below.
For items other than listed below, perform inspection according to the inspection items listed in the User's Manual of the PLC CPU module in order to always use the system in the optimal condition.

(the Q series C24 inspection items)

1) Check if the terminal resistors and cables are connected securely.
2) Verify that the module installation screws and the terminal block installation screws are securely tightened.

POINT
Be sure to read through the Safety Precautions in the beginning of this manual regarding the Q series C24 inspection and maintenance.

4.9.2 When mounting/dismounting the module

Please read 4.1, "Handling Precautions" before mounting or dismounting the module, and make sure to pay attention to safety and handle the module properly during the operation.
When replacing the Q series C24 and QCPU, it becomes necessary to register the following data on the Q series C24 again for the module to be replaced.

- Q series C24: System setting data in the flash ROM
- QCPU: PLC parameters (I/O assignment, switch setting, etc.)

The procedure for replacing a module, including re-registration of data, is as follows.

<Operation procedure when replacing the Q series C24>

(Step 1) Read all the system setting data of the Q series C24 using the Read from module function of GX Configurator-SC.
(Step 2) Save the system setting data read to the specified file using the File Save function of GX Configurator-SC (*1).
(Step 3) Turn the power supply to the Q series C24 off.
(Step 4) Dismount the cables and the module itself.
(Step 5) Replace the module and start up the module according to "4.2 Settings and Procedures Prior to Operation."
(Step 6) Read the data saved in (Step 2) back into the system and register the system setting data to the flash ROM of the Q series C24 using the Write to module function of GX Configurator-SC.

<Operation procedure when replacing the QCPU>

(Step 1) Read the PLC parameters with GX Developer from the QCPU and save them.
(Step 2) Replace the QCPU. (See the user's manual for QCPU.)
(Step 3) Register the PLC parameter saved by GX Developer back into the QCPU again.

*1 It is recommended to record and save the system setting parameters not only when replacing the module, but also when changing the system setting parameters using GX Configurator-SC.

5 DATA COMMUNICATION USING THE MELSEC COMMUNICATION PROTOCOL

This chapter explains an overview of the MELSEC communication protocol (hereinafter abbreviated as the MC protocol). See the following manual for a detailed explanation of the data communication functions that are available when using the MC protocol.
Q Corresponding MELSEC Communication Protocol Reference Manual (SH-080008)

5.1 Data Communication Functions

The MELSEC protocol (MC protocol) is a communication system for the Q series PLCs. Using this protocol, the external devices can read or write device data and programs for the PLC CPUs via the Q series C24 or Q series Ethernet interface module.
Any external devices on which application programs can be installed and which can transmit and receive data in accordance with the MELSEC PLC protocol can communicate with the PLC CPUs using the MC protocol.

5.1.1 Accessing the PLC CPUs using the MC protocol

This section describes the main functions for accessing the PLC CPUs using the MC protocol.
(An overview of the data communication functions using the MC protocol is provided in Section 3.4).
With the exception of the on-demand function described below, the Q series C24 sends and receives data based on commands from the external devices.
Thus, the PLC CPU side does not require sequence programs for data communication.

(1) Data read/write

This function reads and writes data from/to the PLC CPU device memory of the local-station or other station on the MELSECNET/H, MELSECNET/10 as well as the intelligent function module buffer memory.
By reading and writing data, the PLC CPU operation monitoring, data analysis and production management can be performed on the external device side.
Also, production directions can be executed on the external device side.

(2) File read/ write

This function reads and writes files stored in the PLC CPU such as sequence programs and parameter files. By reading and writing files, file management for the GX Configurator-SC and the QnACPUs of other stations can be performed on the external station side.
Also, execution programs can be changed (replaced) from the external device side.

(3) Remote control of the PLC CPU

This function executes remote RUN/STOP/PAUSE/latch clear/reset operations.
Remote operations of the PLC CPU can be performed from the external device side using the PLC CPU remote control function.

(4) Monitoring the PLC CPU

This function monitors the operating status of the PLC CPU and the data in the device memory.
The PLC CPU status and the device memory data can be sent to the external device at fixed intervals, when an error occurs in the machine equipment, or when certain conditions are satisfied.
This function reduces the data read processing load on the external device side.

(5) Sending data from the PLC CPU to the external device

A function for requesting data transmission from the PLC CPU to the external device is called the on-demand function.
Urgent data that must be forwarded to the external device can be sent as on-demand data to the external device by starting up from the PLC CPU.

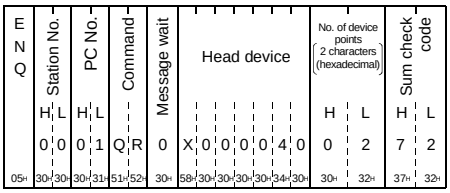
5.1.2 Message format and control procedure for data communication

The data communication functions using the MC protocol correspond to the data communication functions using the dedicated protocol for the conventional products listed below.

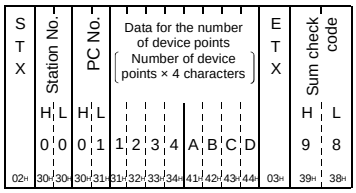
- A series computer link module
- QnA series serial communication module

Therefore, the message format and control procedure are the same as when accessing the PLC using these conventional modules.
The external device side can access the Q series PLC with a program used for accessing the PLC via a conventional module.

(Example)



(Command message for A compatible 1C frame)



(Response for A compatible 1C frame)

POINT

The following manual is available for performing data communication using the MC protocol.
MELSEC Communication Protocol Reference Manual (sold separately)

5.1.3 PLC CPU setting for performing data communication

Data communication using the MC protocol is achieved by performing the GX Developer settings indicated below on a PC, performing the system settings by the GX Configurator-SC, and registering the settings to the PLC.

(1) Settings using the GX Developer (Required)

Perform the I/O assignments and switch settings indicated in Section 4.5 and write the parameters to the PLC CPU where the Q series C24 is installed.

(2) System settings using the GX Configurator-SC

When it is necessary to change the default values registered in the Q series C24, perform the settings as indicated in Chapter 8 and register these to the flash ROM in the Q series C24.

- MC protocol system setting
- Transmission control and others system setting

POINT
To write from the external device to the intelligent function module installed in the MELSECNET/H remote I/O station during communication using the MC protocol, set the "Write allow/prohibit during PLC CPU RUN" in the GX Developer to enable.

5.1.4 Support of multiple CPU system or redundant system

When the external device accesses a QCPU in a multiple CPU system or redundant system, it is possible to selectively access either a control or non-control CPU in the multiple CPU system or a control or standby system CPU or System A or System B CPU in the redundant system by specifying the target QCPU in "Requested module I/O No." of the QnA compatible 4C frame for the MC protocol.
Refer to the Reference Manual for details.
Refer to Chapter 2 of this manual for the system configuration.

(Example) When multiple CPU No.1 is specified

	ENQ	Frame ID No.	Station No.	Network No.	PC No.	Requested module I/O No.	Requested module station No.	Self-station No.	Command	Sub command	Device code	Head device	Number of device points	Sum check code
		H L	H L	H L	H L	H — — L	H L	H L	H — — L	H — — L		H — — — — L	H — — L	H L
		F 8	0 5	0 7	0 7	0 3 E 0	0 0	0 0	0 4 0 1	0 0 0 1	X *	0 0 0 0 4 0	0 0 0 5	3 6
05H		46H 38H	30H 35H	30H 37H	30H 33H	30H 33H 45H 30H	30H 30H	30H 30H	30H 34H 30H 31H	30H 30H 30H 31H	58H 2AH	30H 30H 30H 30H 34H 30H	30H 30H 30H 35H	33H 36H

(Command massage of the QnA compatible 4C frame format 1)

REMARK

- When using the Q series C24 in a multiple CPU system, it is necessary to specify the QCPU that controls the Q series C24 (hereinafter referred to as the control PLC) using GX Developer.
- It is also possible to mount a Q series C24 of function version A in a multiple CPU system. In this case, it is only possible to access the control PLC (PLC No.1).
- It is only possible to access the control PLC if data is communicated by means of frames other than the QnA compatible 4C frame.

5.1.5 Support for the QCPU remote password function

This section explains an overview of the remote password function when a remote password is set for the Q series C24 mounted to a QCPU.
See Chapter 3 of the User's Manual (Application) for a detailed explanation.

(1) Checking remote passwords

If the following items are set to the QCPU using GX Developer, the Q series C24 performs a remote password check whenever an external device accesses the PLC using the modem function of the Q series C24.

(a) Setting by GX Developer
- When the remote password is set on the QCPU with the Q series C24.
- When the Q series C24 is set to be subject to the remote password check.

(b) Access in which the remote password is checked
The remote password is checked when the following access is attempted. Access attempts to all PLCs of the local station (the local station with the Q series C24 and other stations accessed via the local station) are subject to the remote password checking.

(Access function to the PLC in which the remote password is checked)
- Data communication using the MC protocol
- Access to the PLC using GX Developer

* The remote password is not checked in data communication using the non procedure/bidirectional protocols.

(c) Remote password to be checked
The check is performed against the remote password set to the local station QCPU with the Q series C24.

* Access to the specified station is allowed if the remote password specified by the user and the remote password set to the QCPU match when accessing.

(2) Data communication procedure

1) Initialize the modem.
2) Connect the line from the external device.
3) Unlock (cancel) the remote password of the QCPU belonging to the station with the Q series C24 mounted from the external device via the dedicated command for communication using the MC protocol.
4) Initiate the data communication between the external device and PLC using the MC protocol.
5) Disconnect the modem line from the external device side when completing the data communication using the MC protocol.
The remote password is automatically locked when the modem is disconnected.

REMARK

The remote password should be set to a QCPU using GX Developer in order to use the remote password function of QCPU.

- Unlocking the remote password is possible only for the QCPU of the local station with the Q series C24.
  It is impossible to unlock the remote password for the QCPU of other stations.
  See Section 3.18 of the Reference Manual for the command for unlocking the remote password.
- When accessing the PLC using GX Developer, the remote password should be unlocked when starting the online operation.

(3) Q series C24 setting and monitoring function when using the QCPU remote password function

(a) Modem function system setting by GX Configurator-SC

1) Remote password mismatch notification count designation
   Designate the number of times before notification when a remote password disagreement occurs at the unlock processing by the user/external device after the line is connected.
   The Q series C24 automatically disconnects the line if more remote password disagreements occur than the number of times designated by this value.

2) Remote password mismatch notification accumulated count designation
   Designate the number of times before notification when remote password disagreements occur at the unlock processing by the user/external device after the startup of the Q series C24.
   The error signal on the CHn side (XE, XF) and the ERR LED turn on if remote password disagreements occur more than the number of times designated by this value (the line is not disconnected).
   ✻ The user can clear the cumulative value counted by the Q series C24 at an occurrence of remote password disagreement using either one of the methods below:
   - Set the cumulative number of abnormal completions of unlock processing to "0" in the modem function monitor/test screen of GX Configurator-SC.
   - Write "0" to the storage area in the buffer memory corresponding to the Accumulated count of abnormal completions of unlock processing (address: 8956 ($22FC_H$)).

(b) Modem function monitor/test by GX Configurator-SC

It is possible to monitor the setting values for the remote password and the number of occurrences up to the present, such as the designation of the number of times before notifying an unmatched remote password and the current number of occurrences.

* It is possible to set each monitor value to "0."

Monitored items in the “modem function monitor/test” screen	Buffer memory address
Remote password mismatch notification count designation	8204 ($200C_H$)
Remote password mismatch notification accumulated count designation	8205 ($200D_H$)
Accumulated count of unlock process normal completion	8955 ($22FB_H$)
Accumulated count of unlock process abnormal completion	8956 ($22FC_H$)
Accumulated count of lock process based on circuit disconnection	8959 ($22FF_H$)

5.2 Utilizing the MX Component

If the external device is a PC running one of the basic operation systems below, it is possible to create a communication program for the external device without considering the detailed MC protocol (transmission/reception procedures) using one of the following separately sold communication support tools.
See Appendix 7 for the overview of MX Component.

(Supported basic operation systems)

- Microsoft® Windows® 95 Operating System
- Microsoft® Windows® 98 Operating System
- Microsoft® Windows NT® Workstation Operating System Version 4.0
- Microsoft® Windows® Millennium Edition Operating System
- Microsoft® Windows® 2000 Professional Operating System
- Microsoft® Windows® XP Professional Operating System
- Microsoft® Windows® XP Home Edition Operating System

* Depending on the version of MX Component used, different operating systems are supported.
See the manual of MX Component for details.

(Communication support tools)

- MX Component (SW0D5C-ACT-E or later.)

6 DATA COMMUNICATION USING THE NON PROCEDURE PROTOCOL

Data communication using the non procedure protocol is a function for sending and receiving data between a PLC CPU and an external device using the message format and transmission control procedure specified by the user.
Data can be transferred using the non procedure protocol when it is necessary to perform data communication using the protocol for external devices such as a measuring instrument and a bar code reader. In that case, transmission/receive data processing can be simplified by using the communication functions with the user frames described in the User's Manual (Application).

This chapter explains the basic transmission and reception methods when performing data communication using the non procedure protocol.
Follow the procedure described in this chapter to create sequence programs for sending and receiving data for the PLC CPU.
For details on the additional functions listed below for data communication using the non procedure protocol, see the separate User's Manuals (Application).

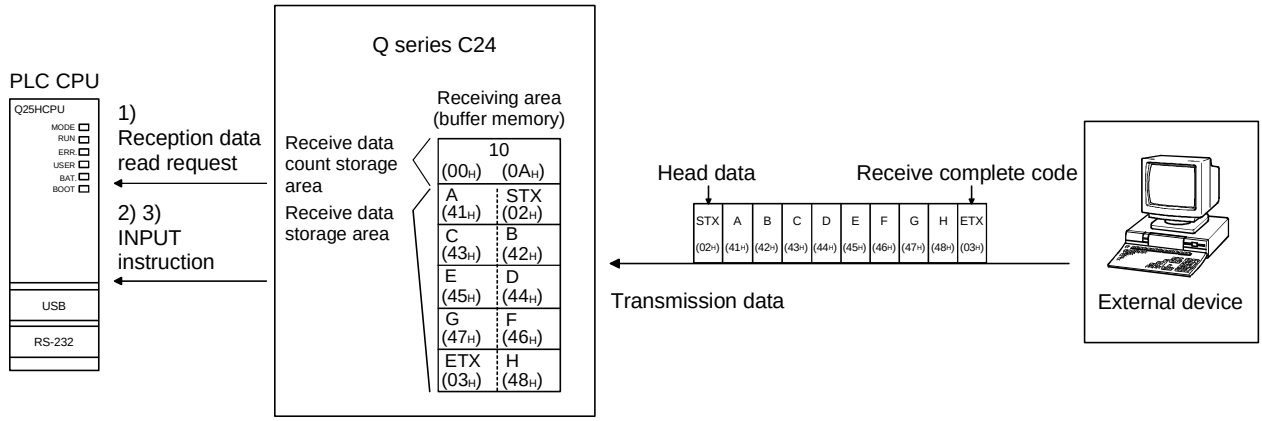
- Sending/receiving data using user frames (See Chapter 11, Application)
- Monitoring the PLC CPU (automatic information function) (See Chapter 2, Application)
- Switching modes from the PLC CPU (See Chapter 15, Application)
- Reading received data using interrupt programs (See Chapter 4, Application)
- Sending/receiving data using transparent code designation (See Chapter 12, Application)
- Sending/receiving data using ASCII data (ASCII-BIN conversion) (See Chapter 13, Application)
- Controlling half-duplex communication (See Chapter 8, Application)

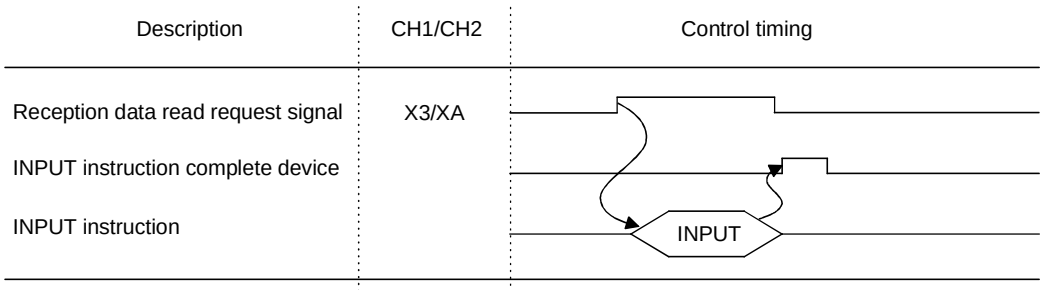
6.1 Data Reception from the External Device

This section explains data reception from the external device.
There are two methods for receiving data: the "reception via receive complete code" for receiving variable length messages, and the "reception via received data count" for receiving fixed length messages. The receive complete code and received data count used for data reception can be changed to any setting values chosen by the user using GX Configurator-SC.

6.1.1 Receiving methods

The following shows the methods for receiving data in any format using the non-procedure protocol.
There are two methods for receiving data: the "reception via receive complete code" for receiving variable length messages, and the "reception via received data count" for receiving fixed length messages. The receive complete code and received data count used for data reception can be changed to any setting values chosen by the user using GX Configurator-SC.





1) When data is received from the external device using either "reception via receive complete code" or "reception via received data count" method, the reception data read request signal (X3/XA) turns ON.
2) Control data is stored in the device designated with the INPUT instruction.
3) When the INPUT instruction is executed, receive data is read from the reception area of the buffer memory.

(1) Data reception by receive complete code (for variable length reception)

(a) This method is used to send data by adding the receive complete code set in the Q series C24 at the complete of the message to be sent from the external device.

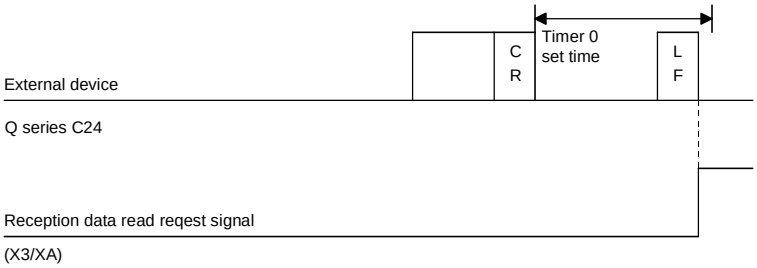
(b) When the Q series C24 receives the receive complete code data preset in GX Configurator-SC by the user, it sends a receive data read request to the sequence program.
The read request from the Q series C24 allows the sequence program to read the receive data up to the receive complete code received from the external device.

(c) The receive complete code can be changed to match the specifications of the external device. An arbitrary 1-character (1-byte) code within the 00_H to FF_H range can be designated.

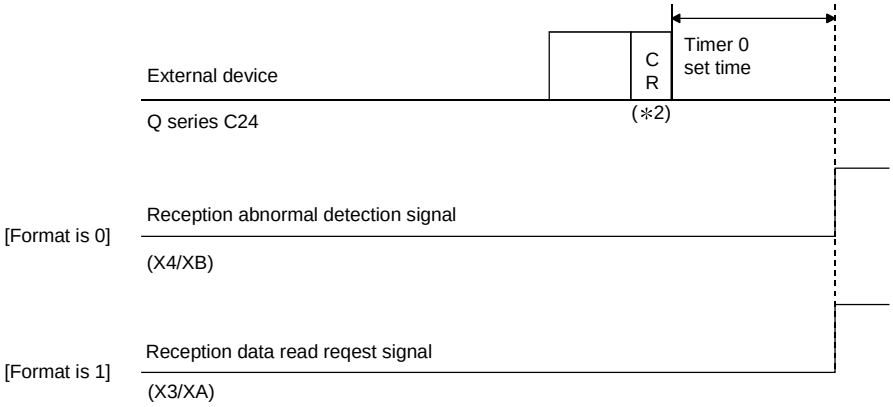
(d) The Q series C24 issues a receive data read request to the PLC CPU as follows, according to the set value of the receive end code.

1) When receive complete code not changed (Default value: $0D0A_H$)
(CR+LF is added to the end of the message and sent from the external device.)

- If LF is received within the time set in the no-reception monitoring time (timer 0) after CR is received, the Q series C24 stores the receive data up to CR+LF to the buffer memory receive data storage area and turns on the read request signal to the PLC CPU.



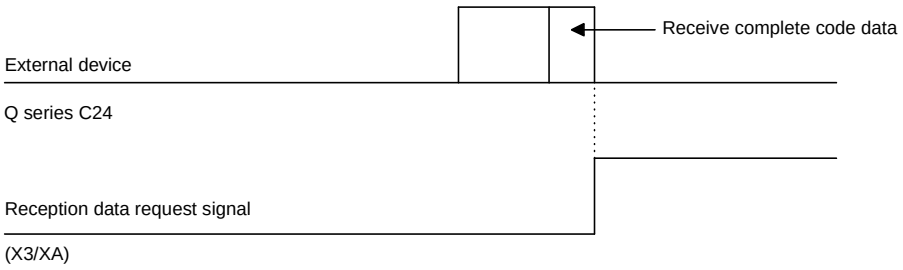
• If the next data (LF, etc.) is not received within the time set in the non reception monitoring time (timer 0) after CR is received, the Q series C24 stores the received data up to CR to the buffer memory receive data storage area and turns on the following signals to the PLC CPU.
When non procedure and non reception monitoring time format is 0:
Reception abnormal detection signal (X4/XB)
When non procedure and non reception monitoring time format is 1:
Reception data read request signal (X3/XA) ∗1



∗1 In non procedure protocol, a message is received by the increase in non reception monitoring time (timer 0) if the received complete code and the received data count are not decided.
For the non procedure protocol at the non reception monitoring time format, see Chapter 6 of the User's Manual (Application).

∗2 CR is included as 1 byte of data included in the message.

2) When the receive complete code is changed and an arbitrary code is designated (00□□H designated)
(User defined receive complete code data is added to the end of the message and sent from the external device).
When the Q series C24 receives the receive complete code data changed by the user, it stores the receive data up to the receive complete code to the buffer memory receive area and turned on the read request signal to the PLC CPU.



3) When receive complete code not designated (FFFFH designated)
Reading by received data count is enabled.
See (2) for a description of reading by received data count.

(2) Reception by received data count (For fixed length reception)

(a) This method is used to receive messages of the same length (size) from the external device every time.

(b) When the Q series C24 receives data of the received data count preset in GX Configurator-SC by the user, it sends a reception data read request to the sequence program.
When the sequence program receives the read request from the Q series C24, it reads data up to the received data count received from the external device.

(c) The received data count default value is set to 511 (words). However, it can be changed within the size of the receive data storage area depending on the data contents exchanged with the external device.

POINT

(1) When the receive complete code and received data count are set to GX Configurator-SC, both become valid.
In this case, if the Q series C24 receives the receive complete code before data corresponding to the received data count, it outputs (X3/XA: ON) a reception read request signal to the sequence program.

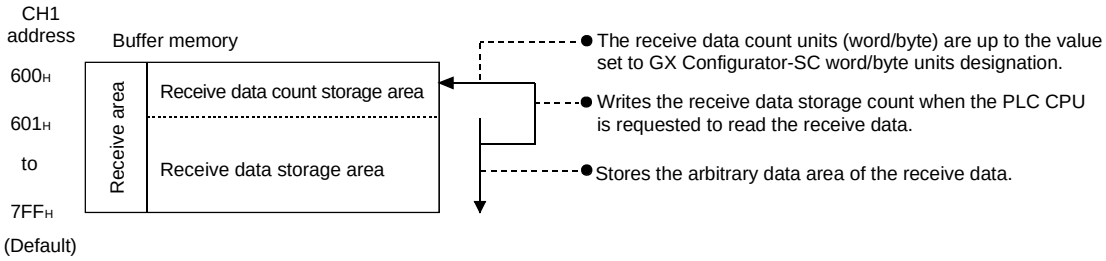
(2) For details on how to change the receive complete code and received data count, see Section 8.4.7.

6.1.2 The receive area and the received data list

The following shows the list of the receive area and the receive data for performing data reception using the non procedure protocol.

(1) Receive area

The receive area is a memory area for storing the data received from the external device and the receive data count in order to read the receive data for the PLC CPU. By default, the receive area is assigned to addresses 600_H to $7FF_H$ (CH1 side) and $A00_H$ to BFF_H (CH2 side).



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POINT

(1) The position and size of the receive area in the buffer memory can be changed with the GX Configurator-SC in accordance with the specifications of the external device and the receive data length. (See Section 8.4.7.)

(a) When changing the position and size of the receive area in the buffer memory with GX Configurator-SC, specify as follows:

1) Receive buffer memory head address designation
Designate the starting address for the area to be used as the receive area in the user-definable area of the buffer memory (address: 400H to 1AFFH, 2600H to 3FFFH).

2) Receive buffer memory length designation
Designate by address the length of the area (0001H to 1A00H) to be used as the receive area in the user-definable area of the buffer memory (address: 400H to 1AFFH, 2600H to 3FFFH).

(b) If the following functions are also used when the position and size of the receive area in the buffer memory are changed, make sure that the addresses of the receive area do not overlap with those for the buffer memory that stores the transmission and reception data to be used by these functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Communication data monitoring function

(2) When sending data from the external device to the Q series C24, one of the following two adjustments should be made so that the relationship shown below is maintained.

1) Reduce the transmission data size.
2) Increase the receive area.
Receive data storage area $\geqq$ Size of data sent from the external device

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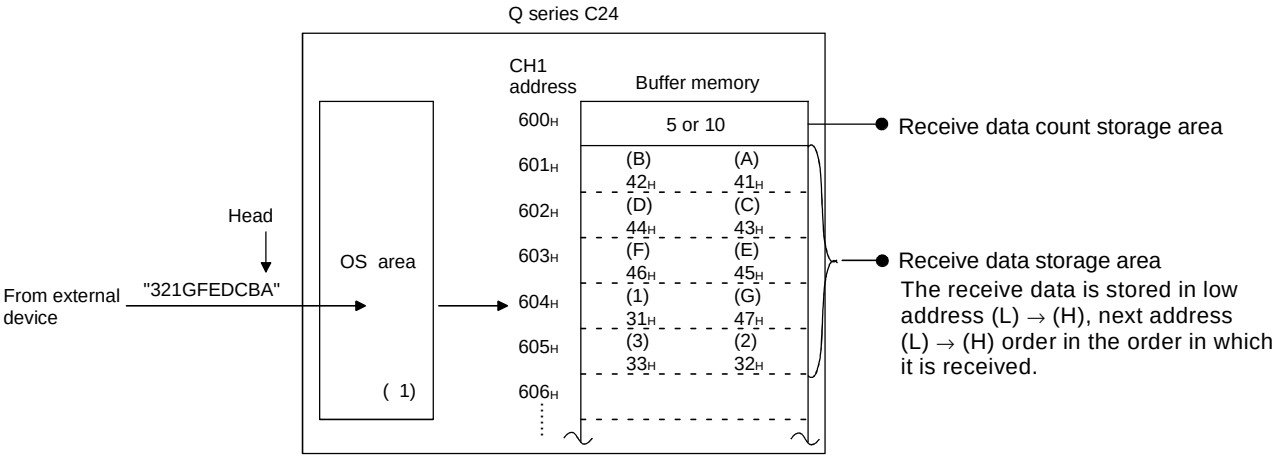
(2) Receive data list

The following describes the data list when data received from an external device is stored to the receive area.

1) The receive message is stored to the Q series C24 buffer memory (receive data storage area).
2) The data is stored to the receive data storage area in low address (L) → (H), next address (L) → (H) order.
   ＊ Under the following conditions, when the receive data count is an odd byte, 00H is stored in the upper byte of the final data storage position:
   • When the unit for the received data count is designated in bytes.
   • When data reception is performed using the receive complete code.

(Example) When receive arbitrary data area "ABCDEFG123" was stored (The receive area is the default value.)



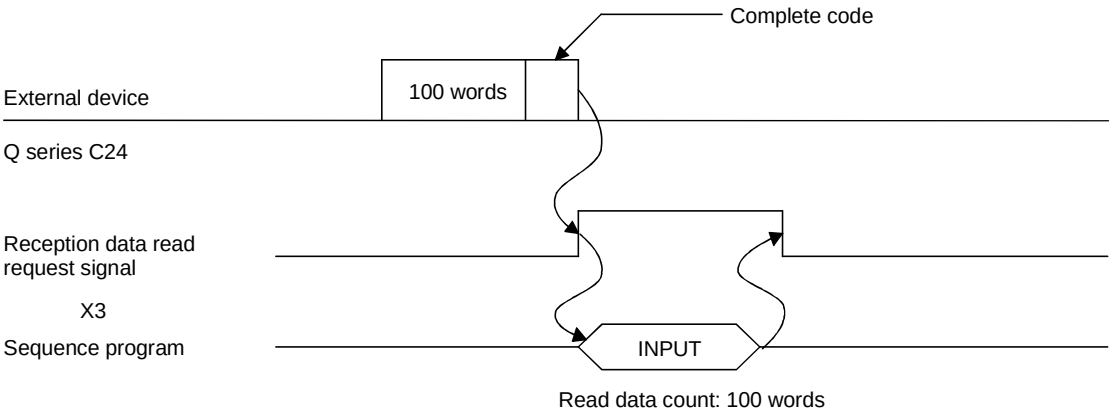
＊1 The OS area of the Q series C24 shown in the above diagram is the memory (8448 bytes) that temporarily stores the data to be received while a request for the reading of the receive data is being made to the PLC CPU. (The user cannot read the receive data in the OS area).
When the sequence program finishes reading the receive data in the buffer memory in response to the read request, the receive data in the OS area, and any succeeding receive data, is stored successively in the receive area of the buffer memory when the next read request is issued.
Also, when the OS area's free space, which stores the receive data, is reduced to 64 bytes default value or less, a request to discontinue data reception from the external device is issued by the following transmission control (the RS signal does not turn OFF):
• When DTR control is set, the DTR signal turns OFF.
• When DC1/DC3 control is set, DC3 is sent.
When there is no more free space in the OS area to store receive data, an SIO error occurs and the SIO information bit in the communication error information storage area (address: 201H/202H) in the buffer memory turns ON. In that case, succeeding receive data is discarded until a free space becomes available in the OS area.
＊ For more details on the transmission control, see Chapter 7 of the User's Manual (Application).

REMARK

(1) Data reception when the receive data storage area is larger than the receive data length

The following control is performed.

(Example) When the receive area for the CH1 side interface is located at addresses 600H to 7FFH (default values) and data of 511 words or less is received by the CH1 side interface.

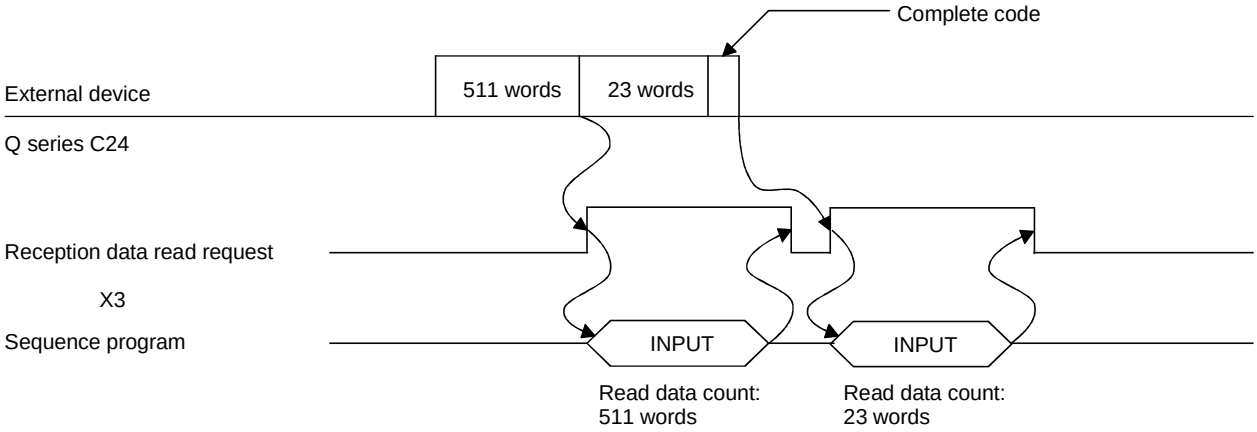


(2) Data reception when the receive data storage area is smaller than the receive data length

Since the following control is performed, data link processing is required in the sequence program.

1) Reception using the complete code

(Example) When the receive area for the CH1 side interface is located at addresses 600H to 7FFH (default values), and data of 534 words is received by the CH1 side interface.



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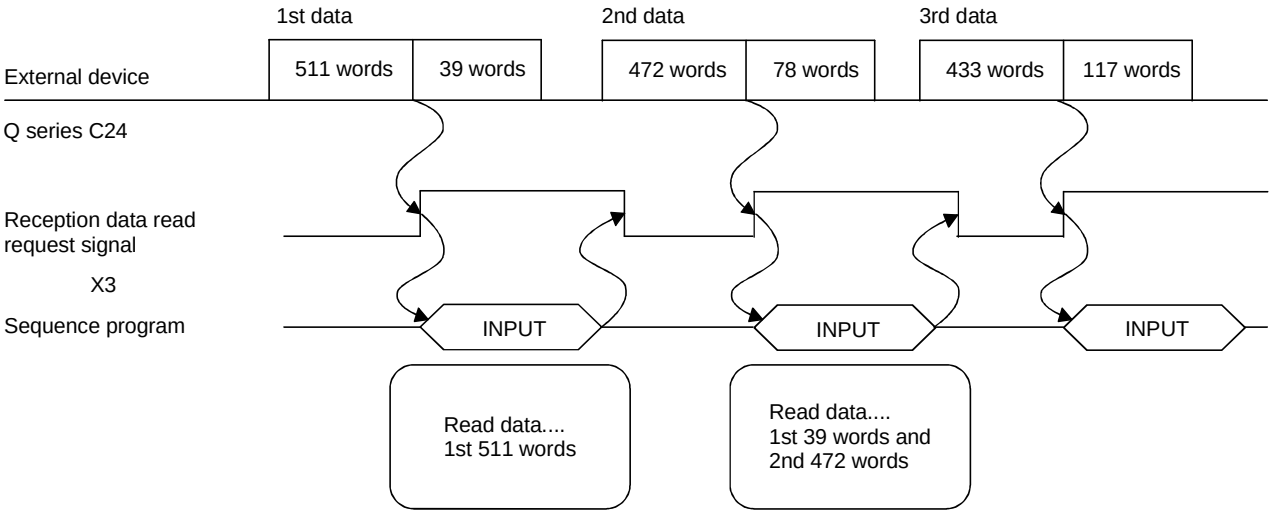
2) Reception by received data count
When the received data count is set larger than the receive data storage area, the receive buffer memory length (default: 512 words) -1 set in buffer memory addresses A7H/147H is processed as the received data count.

(Receive data storage area) > (Data length received from external device)

(Example) When 550 words of data is received through the CH1 interface in three parts when the CH1 interface receive area consists of addresses 600H to 7FFH (default value)



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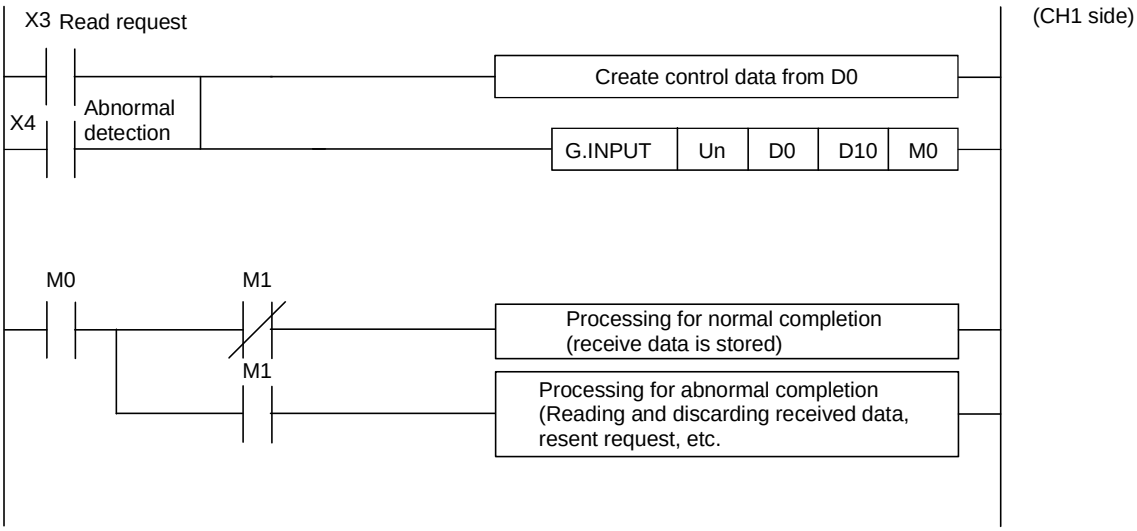
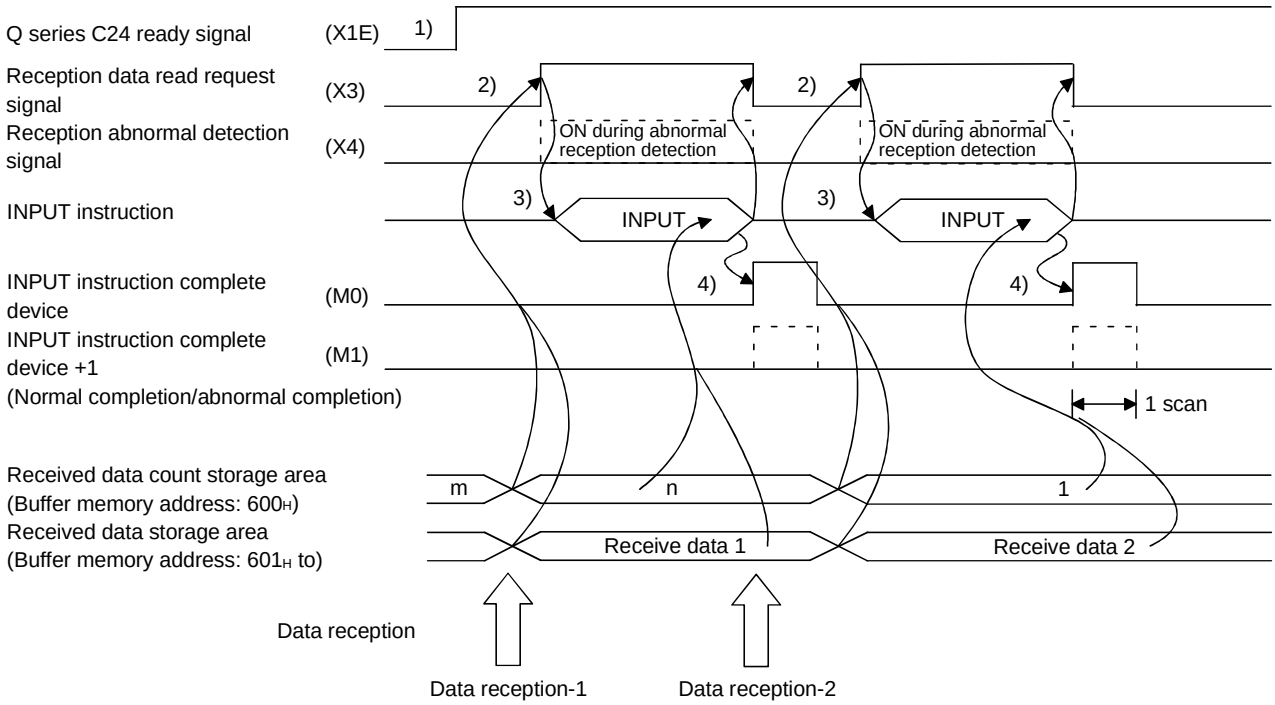
6.1.3 Sequence program for data reception

This section explains the sequence program for data reception.
For details on the INPUT instruction for data reception, see Chapter 9.



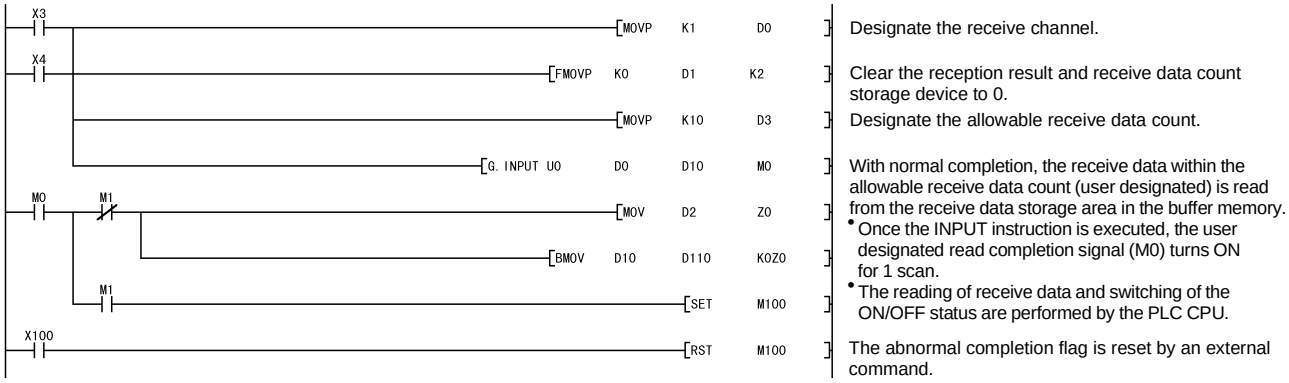
(CH1 side)

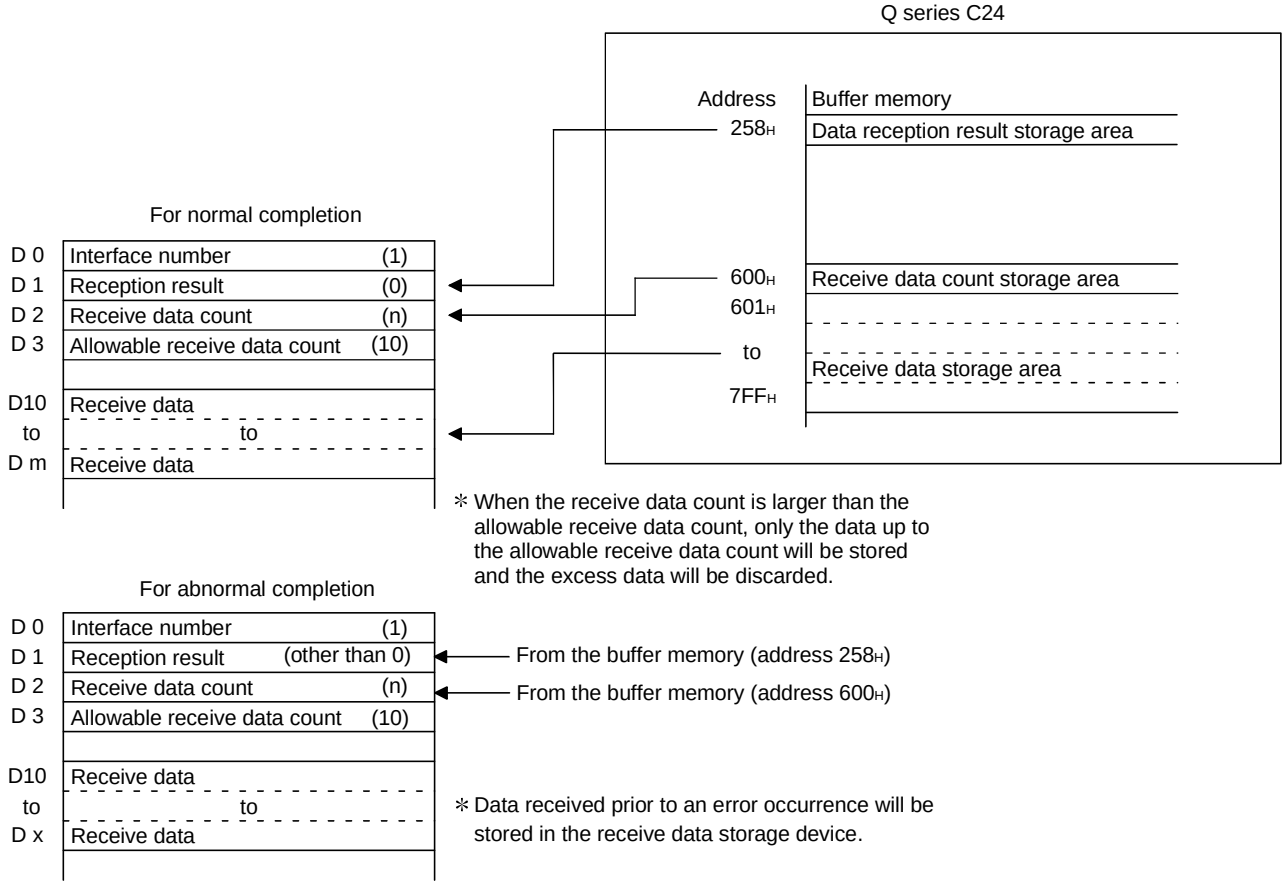


1) Start the self-station PLC.
   The values specified with GX Developer are stored in the Q series C24.
2) When the amount of data specified by the received data count or data containing the receive complete code is received from the external device, the reception data read request signal turns ON.
3) After the control data for the INPUT instruction is stored in the device, the sequence program executes the INPUT instruction and reads the receive data.

4) The device completing the INPUT instruction turns ON when the reading of receive data is completed.
When the complete device + 1 (abnormal completion signal) turns ON, the error code is stored in the control data completion status (S1 + 1).

(Program example)
When the Q series C24 I/O signals are from X/Y00 to X/Y1F:





POINT

(1) Receive data can also be read using interrupt programs.
For more details on reading receive data with interrupt programs, see Chapter 4 of the User's Manual (Application).
Note that if the reading of data received from the same interface is to be performed, it is not possible to combine the reading of data received by the main program and reading of data received by the interrupt program.
Accordingly, use one or the other of the above programs to read the data received.

(2) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 9.)

(3) More than one INPUT instruction cannot be executed simultaneously.
Execute the next INPUT instruction only after the execution of the first INPUT instruction is completed.

(4) When the communication data count is set in word units, and if the received data count is an odd byte when requesting the reading of received data to the PLC CPU, the receive data count is processed as follows:
Receive data count = Receive data byte count/2 ⋯ Fractions following the decimal point are rounded up
Also, 00_H is stored in the higher byte of the final data storage position in the receive area where receive data is stored.

6.1.4 Receive data clear

For the data reception by a non procedure protocol, if the transmission of data from a transmitting device is interrupted due to trouble occurring, it may be necessary for the data received up to the present time are cleared in the receiving device and for the data to be received again from the start.

The methods for clearing reception data in the Q Series C24 is shown below. Either method may be used to clear the reception data as is necessary.

1) Clear the reception data by the dedicated instruction "CSET."
2) Write to/read from the reception data clear request area (address A8H/148H). (FROM/TO instruction)
3) Clear the reception data by GX Configurator-SC (see Section 8.7).

REMARK

When transmitting data to an external device from the Q Series C24, do not execute a clear request of the reception data shown in this section.
If a reception data clear request is executed when transmitting data to an external device, The Q Series C24 stops data transmission and terminates the dedicated instruction for transmission abnormally. (The transmission completed signal does not go ON.) If a reception data clear request is executed during data reception, the data received up to that point are cleared.

(1) Receive data clear processing

The Q series C24 performs the following procession when the receive data clear is performed.

- The data received up to that point can be ignored.
- The receive data count up to that point is "0". (The receive area in the buffer memory is not initialized).
- Set to the status prior to the start of data reception.

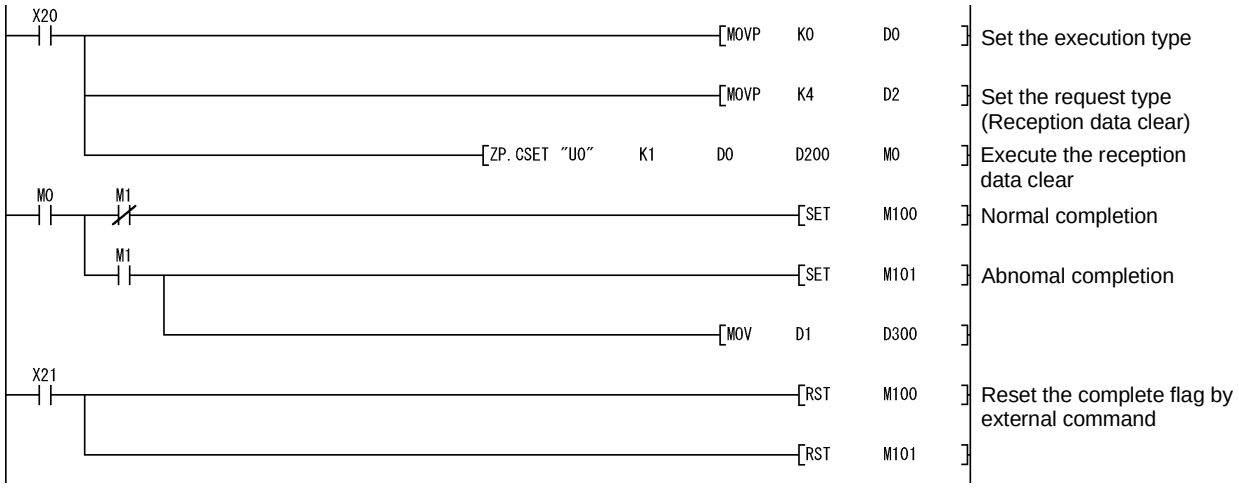
(2) Procedure for clearing the reception data by the dedicated instruction "CSET"

This instruction clears the reception data up to the present without interrupting the data transmission processing.

(Procedure for clearing) ··· In case of the CH1 side interface

1) Execute the CSET instruction
   If the CSET instruction is executed while the read request (X03/X0A) or reception abnormal detection signal (X04/X0B) is turned on, the CSET instruction is kept waiting until the signal is turned off.
2) The reception data clear processing is executed at the OS area of the Q series C24 (see Section 6.1.2).

The following is a program example of clearing the reception data by the dedicated instruction "CSET."



(3) Receive data clear procedure using FROM/TO instruction

Write and read the buffer memory receive data clear request area (addresses A8 H/148H) using the procedure described below.
When resuming data communications with an external device, resume it after completing the reception data clear processing with the Q Series C24.

Depending on the data communications system, it may be necessary to restart data communications with the external device after notifying the external device from the PLC CPU that resumption of communications is possible.

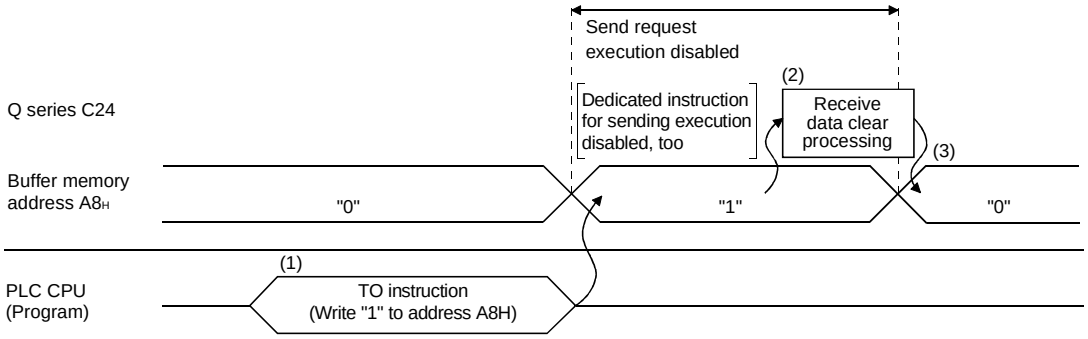
(Clear Procedure)· ··When the CH1 side interface is used.

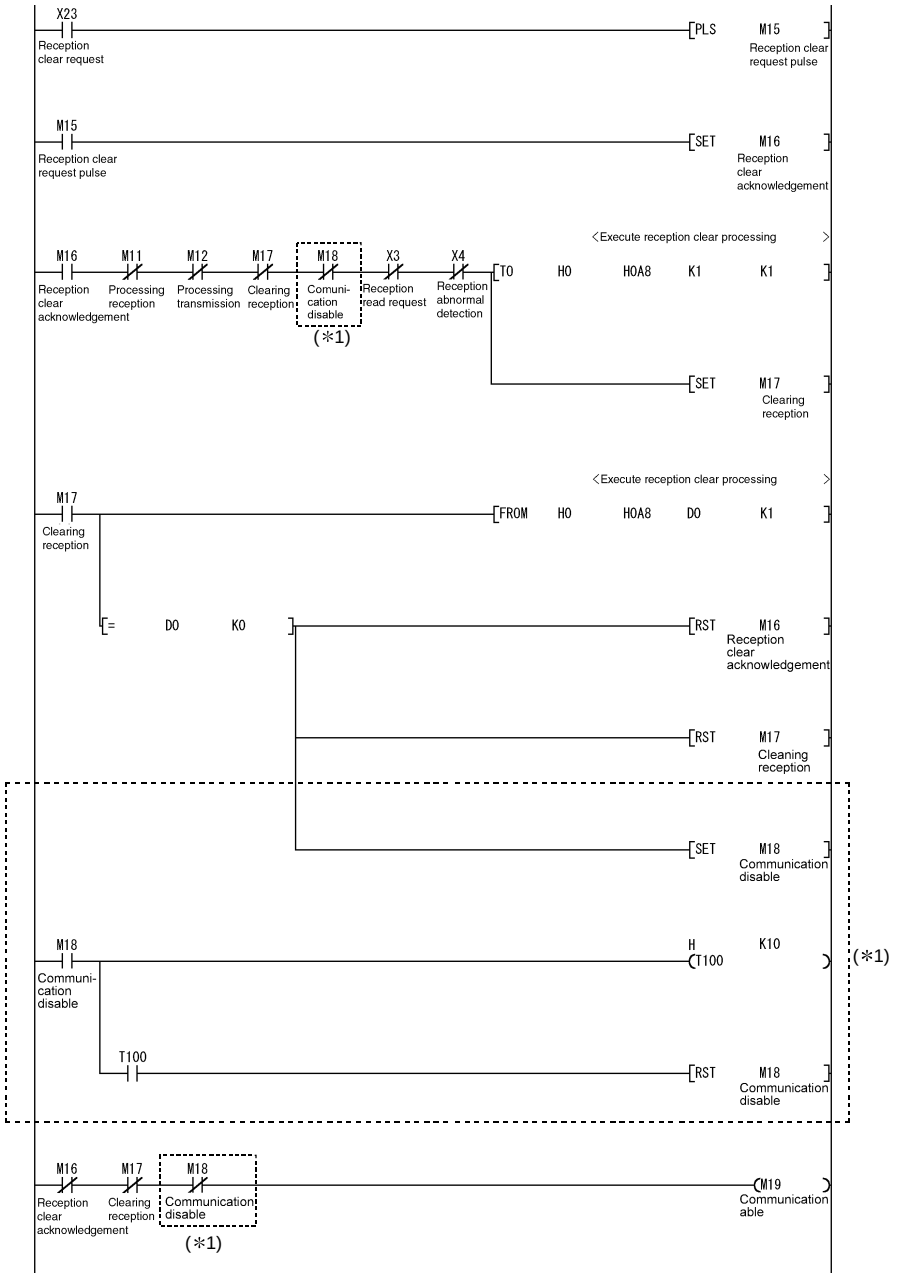
(1) Since receive processing, send processing and receive data clear processing are not being performed, “1” is written to buffer memory address A8H using the TO instruction for the sequence program.
(2) Receive data clear processing is performed for the Q Series C24’s OS area (See Section 6.1.2).
(3) When receive data clear processing is completed, the value in buffer memory address A8H becomes “0.”

The following page shows an example of a program to clear receive data with the FROM/TO instruction.
Create a program that contains the contacts (user flags, etc.) indicating the following statuses in the TO instruction.

- Contact when the CHn reception data read request signal (X3/XA) is OFF
- Contact when the CHn reception abnormal detection signal (X4/XB) is OFF
- Contact indicating that send and receive processes are not currently being performed
- Contact indicating that reception data clear processing is not currently being performed

＊1 When the function version A Q Series C24 is used, resume data communications a further 100 ms after the buffer memory address A8H/148H value changes from a “1” to a “0.”





*1 Add the dotted line portion to the sequence program when the function version A Q Series C24 is used. (Carry out communications when M19 is ON.)

6.1.5 How to detect reception errors

This section explains how to detect errors that may occur when receiving data from the external device.

The following items are considered as the primary causes of errors that may occur during data reception.

Cause of reception error	Reference section	
A transmission error occurred due to noise.	—	
A timeout for the no-reception monitoring (timer 0) occurred.	User's Manual (Application)	Chapter 6
Received data that could not be converted using the ASCII-BIN conversion.		Chapter 13
Received data larger than the size that could be stored in the OS area of the Q series C24.	Section 6.1.2	

(1) Confirmation using the sequence program

1) The following device and input signals turn ON.
   - INPUT instruction complete device + 1
   - Reception abnormal detection signal (X4/XB)
   - ERR LED ON signal (XE/XF)
2) The reception error code can be checked using the INPUT instruction control data ((S1) + 1).
   Or, it can be checked by reading the data reception result storage area in the buffer memory (addresses 258H/268H).
   For details on how to check the error code contents and take corrective actions, see Chapter 10.

(b) How to turn off the ERR LED and clear the error code (see Section 10.1.2.)

1) To turn off only the ERR LED, write "1" to the LED OFF request area (addresses 0H/1H) in the buffer memory.
2) To turn off the ERR LED and clear the error code, turn ON the ERR LED OFF request output signal (YE/YF).

(Example) To perform the ERR LED OFF and the error code clear on the CH1 side

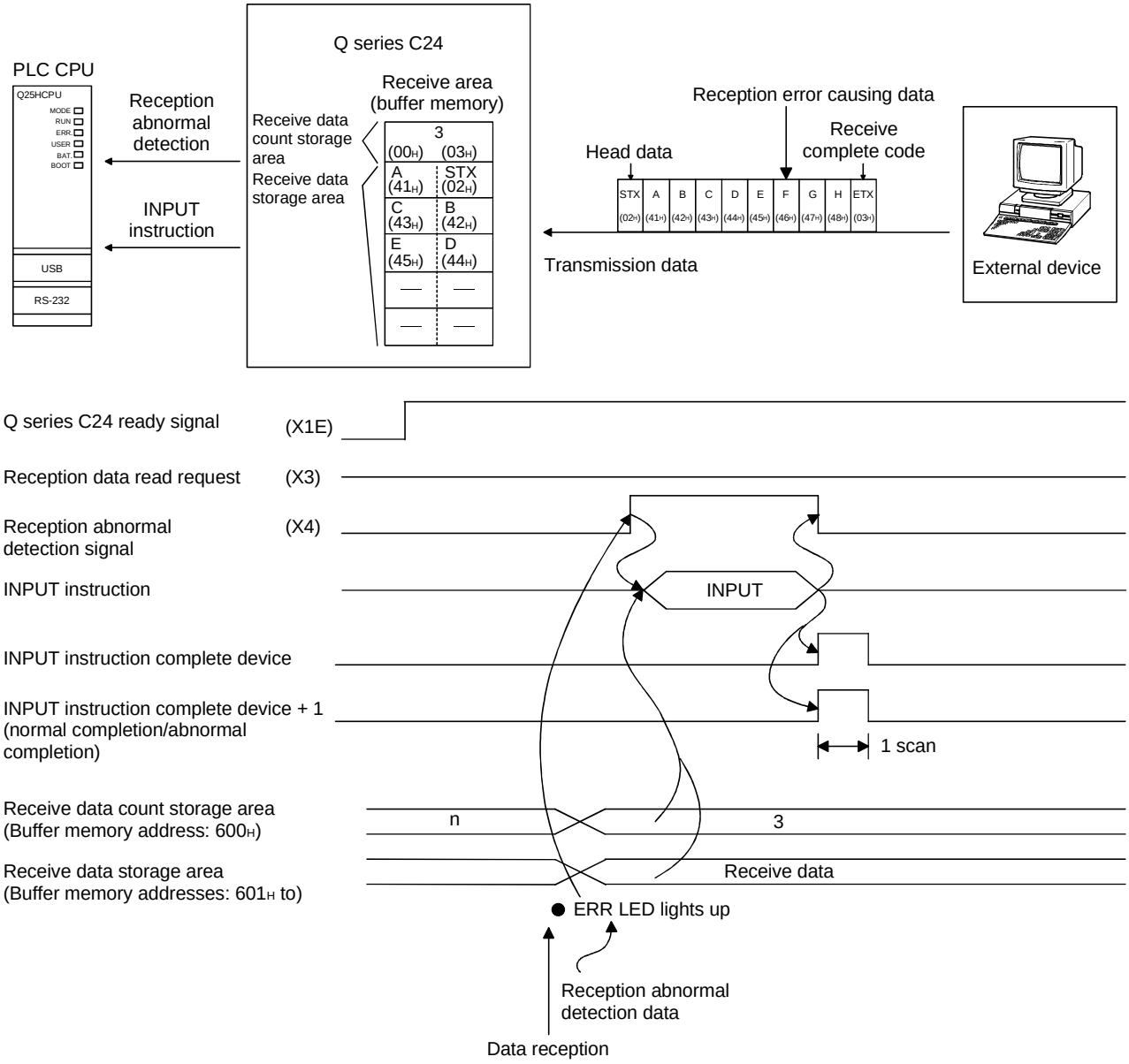
(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a transmission error, the ERR LED lights up. (See Chapter 10.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 8.6.3 and 8.6.5.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 8.6.10.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 8.6.5.)
   - GX Developer buffer memory monitor function (monitors addresses 258H/268H)

(3) Receive data when a reception error occurs

(a) Storing receive data
The receive data for which an error was detected is discarded and only the normally received data is stored in the Q series C24.
Thus, there may be missing data among the data that has been read to the PLC CPU when a reception error occurs.

(b) Reading receive data
When receive data is read to the PLC CPU by turning the reception abnormal detection signal (X4/XB) ON, the data that was normally received prior to the error detection is read. Read and discard receive data as needed.



✻ When the data from "G" to in the reception message shown in the figure above is received normally, the data is stored in the Q series C24 OS area.
The receive data stored in the OS area will be read to the PLC CPU in the succeeding read operation.

6.1.6 Received data count and receive complete code settings

The following default values have been set for the received data count and receive complete code that are used for data reception with the non procedure protocol.
If it is necessary to change the following default settings, change the settings on the GX Configurator-SC "Non procedure system setting" screen according to the specifications of the external device (see Sections 8.4.5 and 8.4.7).

Setting data	Default value	Allowable range	Buffer memory address where the setting value is stored	Remarks
Received data count	511 (1FF$_H$)	Less than the size of the receive data storage area	A4$_H$/144$_H$	Unit is in accordance with the word/byte units designation
Receive complete code	0D0A$_H$ (CR, LF)	0000$_H$ to 00FF$_H$	A5$_H$/145$_H$	When any code is set
		FFFF$_H$		When there is no receive complete code

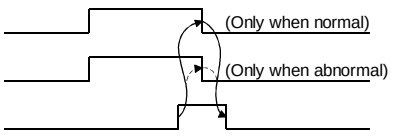
REMARK

Other than through the setting using GX Configurator-SC or the TO instruction at the startup of the Q series C24, the received data count and receive complete code setting values can be changed even after data communication has started if the timing is as shown in the chart below.
The following describes the procedure for changing setting values for data reception via the non procedure protocol after the start of data communication, and for the resumption of data reception processing. Specifically, the module restrictions are explained, along with the timing and procedure for changing the setting values.

(1) Data receiving method

Reception using a dedicated instruction (INPUT) or an interrupt program (*1) cannot be performed. (Transmission using a dedicated instruction (OUTPUT) can be performed.) Data must be received using the FROM instruction in the main program.
The following describes the I/O signals. (A program example is shown on the following page.)

*1 For details on the data reception using interrupt programs, see the User's Manual (Application).

	I/O signal		Signal name	Device that turns ON/OFF		Timing
	CH1 side	CH2 side		CPU	Q series C24	
Reception	X3	XA	Reception data read request		○	
	X4	XB	Reception abnormal detection		○	
	Y1	Y8	Reception data read completion	○		

POINT

When the reception abnormal detection signal (X4/XB) turns ON, read the error code from the buffer memory below, and then check the type of error and take corrective action based on the information found in Chapter 10.
• Data reception result storage area (addresses 258$_H$/268$_H$)

(2) Setting values that can be changed

Of the initial settings from GX Configurator-SC stored in the buffer memory, only the following setting values can be changed after data communication has started.

- Received data count (buffer memory addresses: A4H, 144H)
- Receive complete code (buffer memory addresses: A5H, 145H)

(3) Timing and procedure for changing the setting values

1) Timing of change

To change the receive complete code and received data count after data communication has started, change the setting when the status of the I/O signals relating to the reading of receive data is as follows.

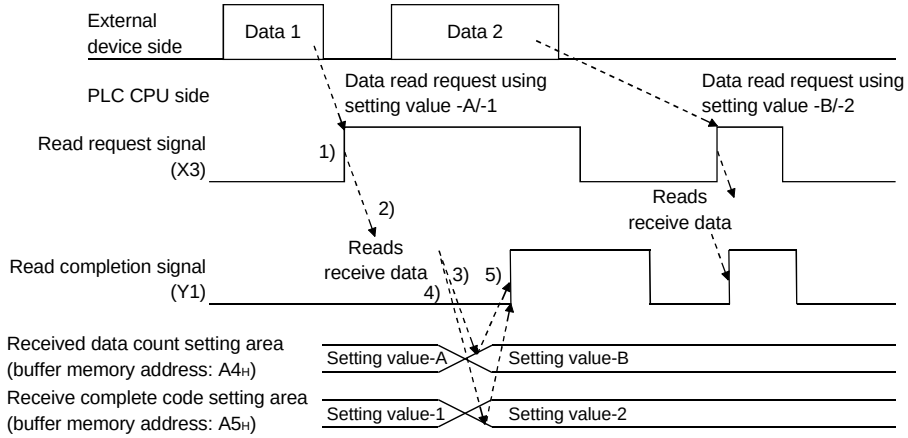
- Reception data read request signal (X3, XA) or reception abnormal detection signal (X4, XB): ON
- Reception data read completion signal (X1, Y8): OFF

2) Change procedure

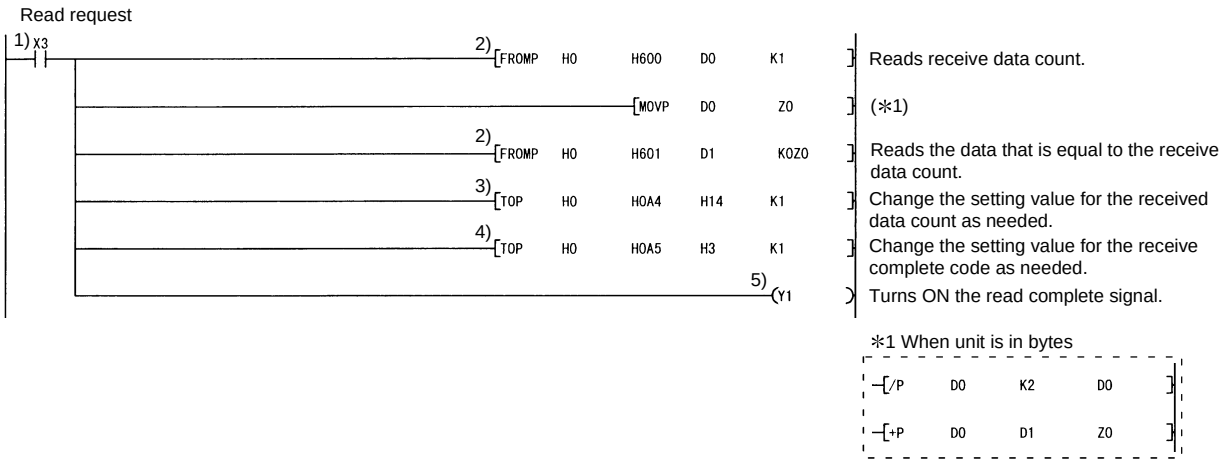
When data reception from an external device causes the reception data read request signal/reception abnormal detection signal to turn ON, turn ON the reception data read completion signal after performing the following.

- Read the receive data.
- Change the setting values for the receive complete code and the received data count.

(Example) When reading data received in the CH1 side interface



(Program example: I/O signals for the Q series C24 are from X/Y00 to X/Y1F)

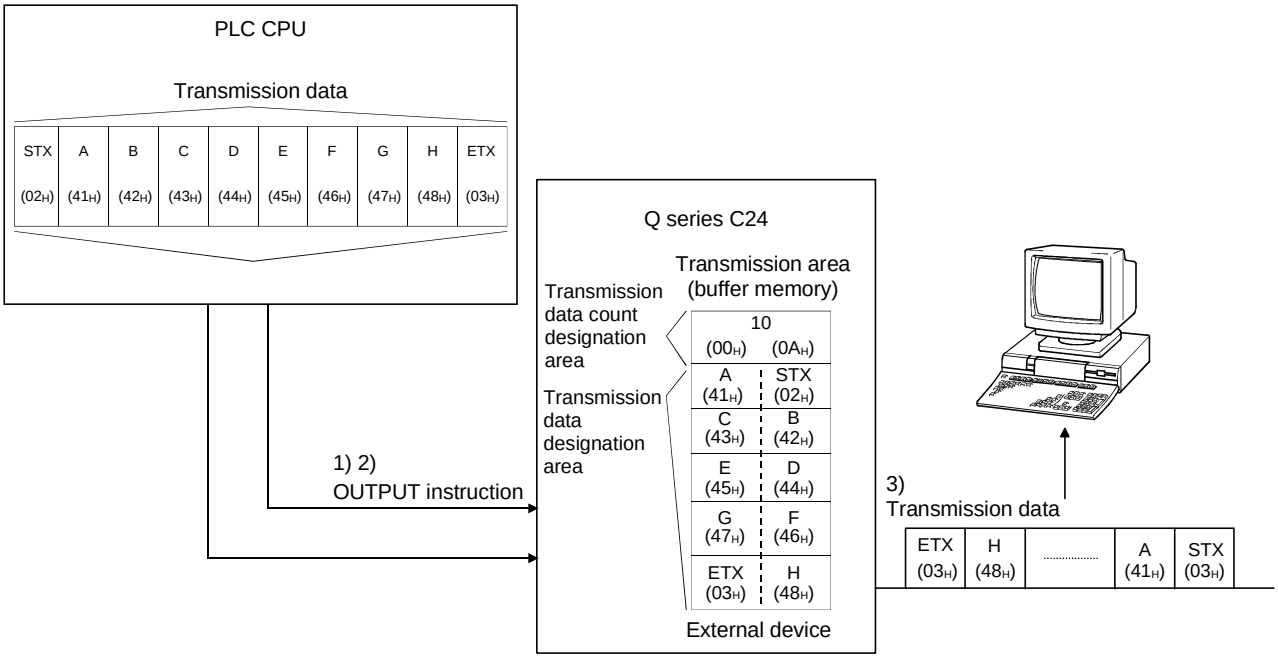


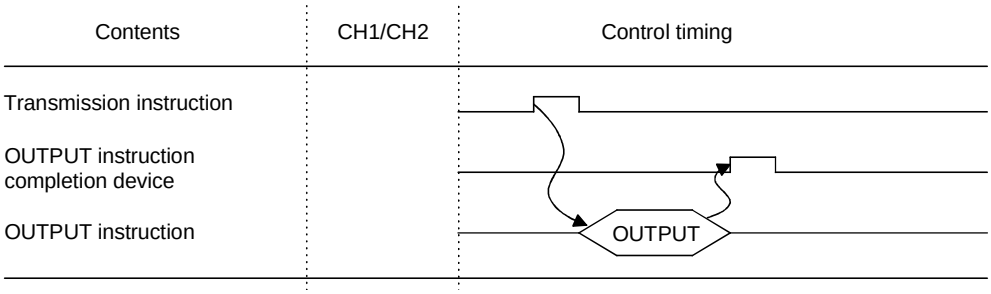
6.2 Sending Data to the External Device

This section explains data transmission from the PLC CPU to the external device.

6.2.1 Transmission methods

The following shows how to send data in any format using the non procedure protocol.





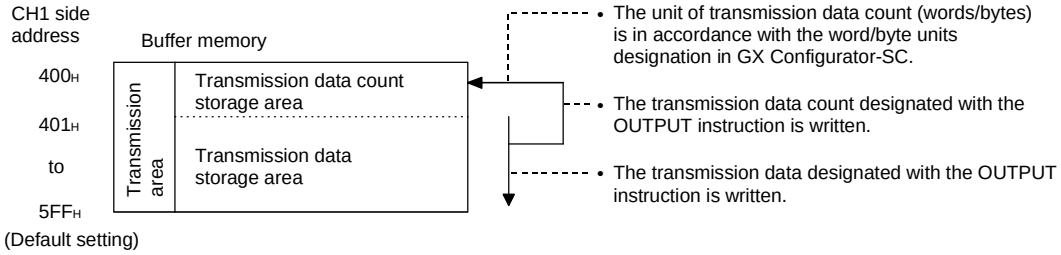
1) Transmission data is stored in the device designated with the OUTPUT instruction.
2) Control data is stored in the device designated with the OUTPUT instruction.
3) When the OUTPUT instruction is executed, the Q series C24 sends the amount of data designated by the transmission data count from the transmission data area to the external device in ascending order of the transmission data area addresses.

6.2.2 Arrangement and contents of the transmission area and the transmission data

This section explains the arrangement and contents of the transmission area and the transmission data for performing data transmission using the non procedure protocol.

(1) Transmission area

The transmission area is a memory area for storing the data and the data count that are transmitted from the PLC CPU to the external device via the Q series C24. By default, the transmission area is assigned to addresses 400H to 5FFH (CH1 side) and 800H to 9FFH (CH2 side).



POINT

(1) The position and size of the transmission area in the buffer memory can be changed with GX Configurator-SC in accordance with the specifications of the external device and the received data length. (See Sections 8.4.5 and 8.4.7.)

(a) When changing the position and size of the transmission area in the buffer memory with GX Configurator-SC, specify as follows:

1) Transmission buffer memory head address designation
Designate the starting address for the area to be used as the transmission area in the user definable area of the buffer memory (address: 400_H to $1AFF_H$, 2600_H to $3FFF_H$).

2) Transmission buffer memory length designation
Designate by addresses the length of the area (0001_H to $1A00_H$) to be used as the transmission area in the user definable area of the buffer memory (address: 400_H to $1AFF_H$, 2600_H to $3FFF_H$).

(b) If the following functions are also used when the position and size of the transmission area in the buffer memory are changed, make sure that the addresses of the transmission area do not overlap with those for the buffer memory that stores the transmission and receive data to be used by these functions.
1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Communication data monitoring function

(2) Set the size of data per data transmission from the PLC CPU to the external device so that it is smaller than the size of the transmission data's designated area in the buffer memory.

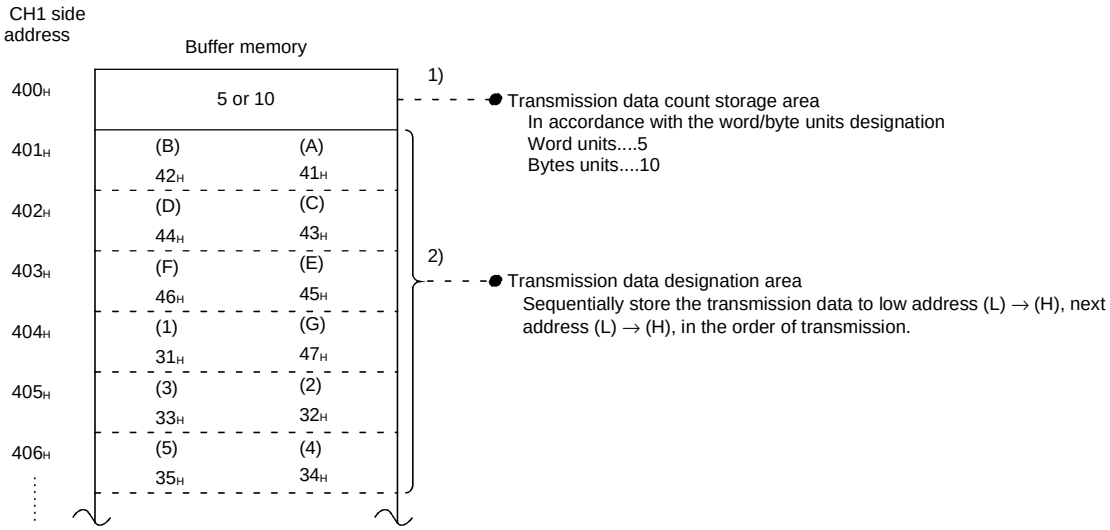
(Transmission data designation area) $\geqq$ (Size of arbitrary data portion to be sent from the PLC CPU)

To transmit data whose size is larger than the transmission data designation area, increase the transmission area, or divide the transmission data before sending.

(2) Transmission data arrangement

The following example shows an arrangement of the transmission data to be sent to the external device when storing it in the transmission area.

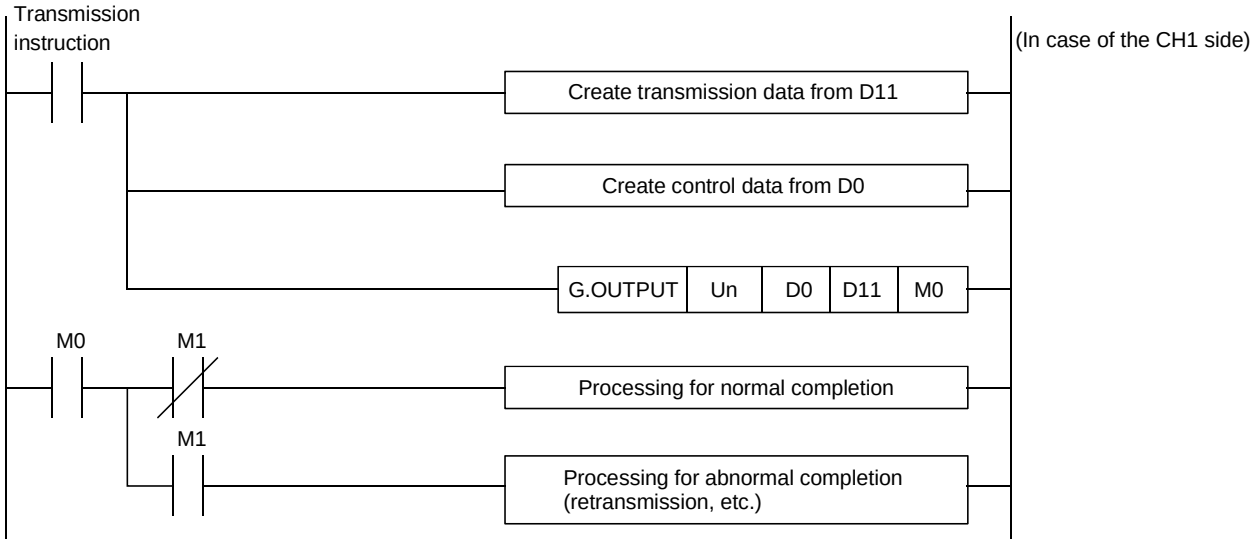
(Example) When transmitting "ABCDEFG123" (The transmit area is the default value.)

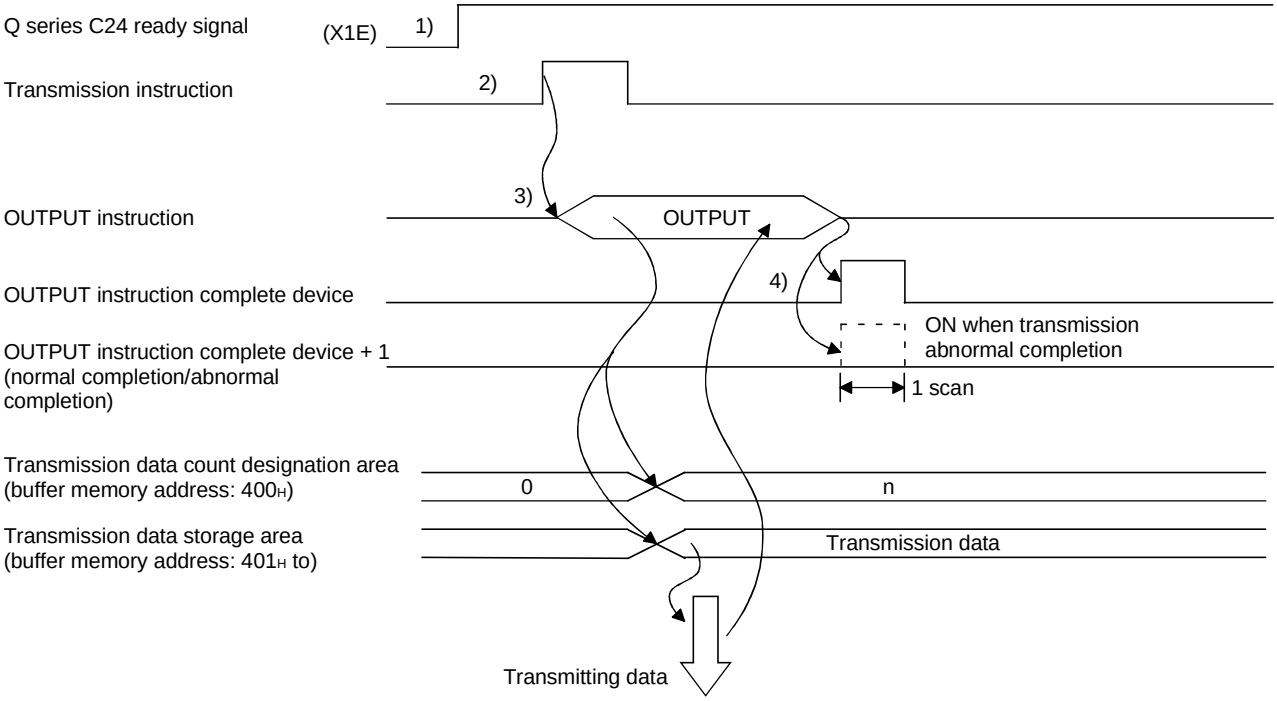


6.2.3 Sequence program for transmission data

A sequence program for transmission data is explained below.

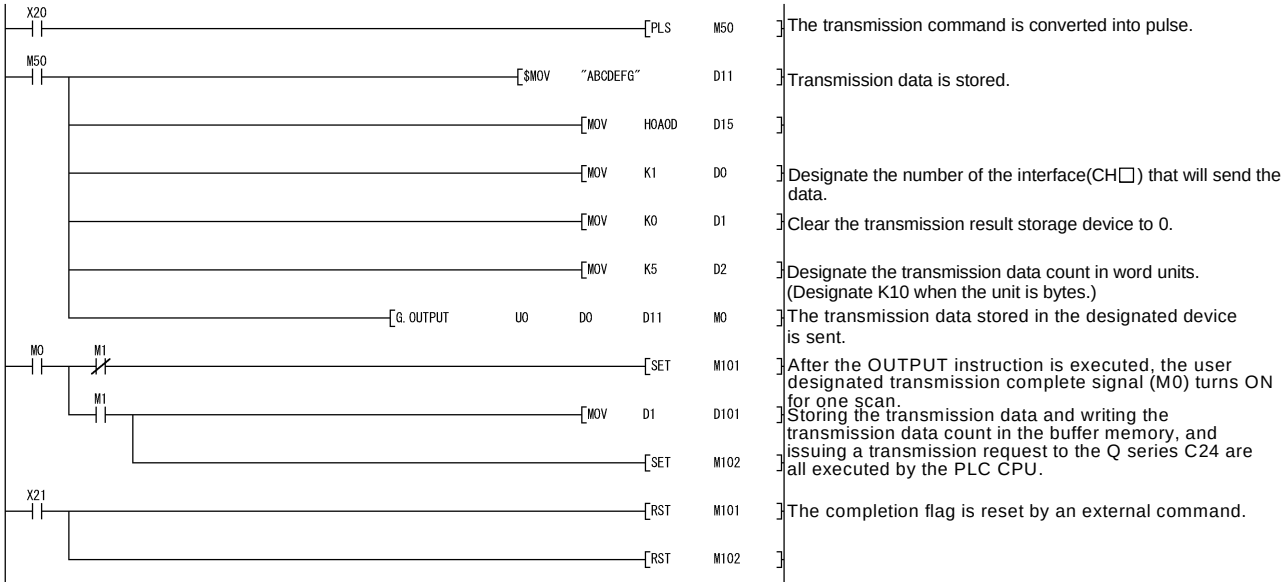
For details on the OUTPUT instruction used for data transmission, see Chapter 9.

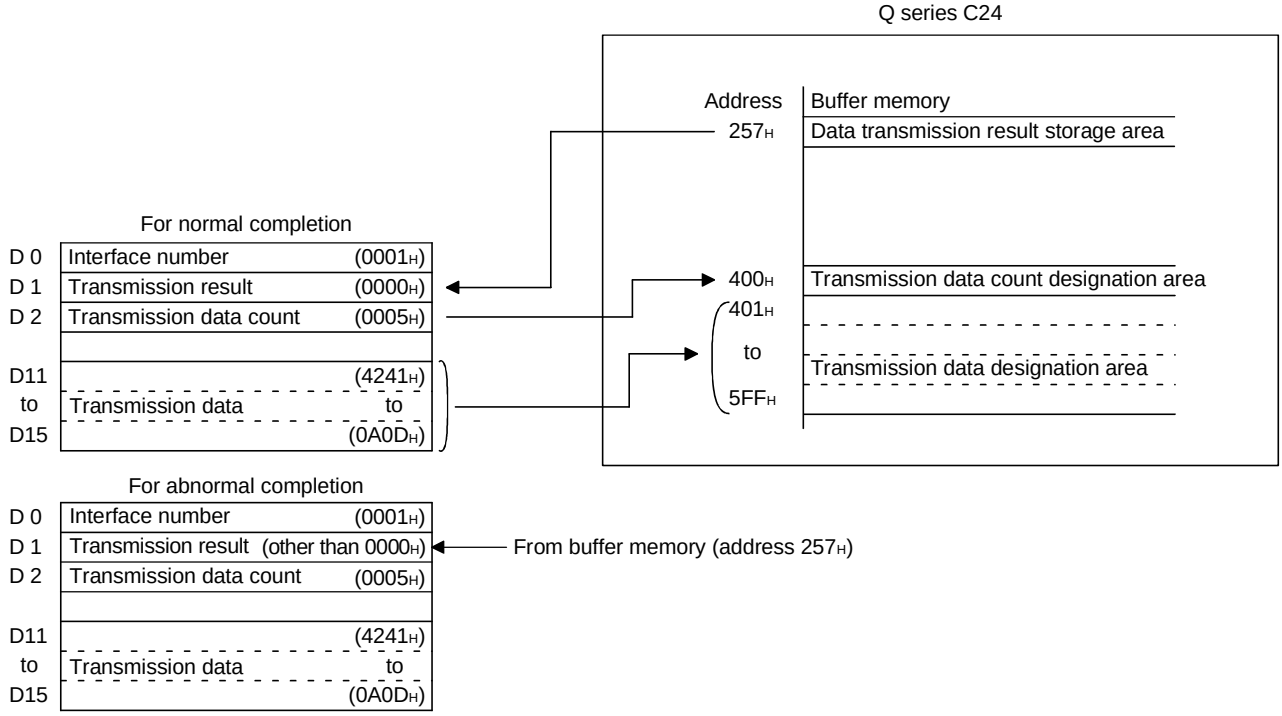




1) Starts the local station PLC.
   The setting values for GX Developer are stored in the Q series C24.
2) Inputs the user data transmission command signal.
3) Executes the OUTPUT instruction after storing the transmission data and the control data for the OUTPUT instruction in the device.
   Data is sent when the OUTPUT instruction is executed.
4) When the Q series C24 transmission processing completes, the completion device for the OUTPUT instruction turns ON.
   When the completion device + 1 (abnormal completion signal) turns ON, the error code is stored in the control data completion status (S1+1).

(Program example)
When Q series C24 I/O signals are from X/Y00 to X/Y1F:





POINT

(1) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 9.)

(2) More than one OUTPUT instruction cannot be executed simultaneously. Execute the next OUTPUT instruction only after the execution of the first OUTPUT instruction is completed.

6.2.4 How to detect transmission errors

This section explains how to detect errors that may occur when sending data to the external device.

The following items are considered as the primary causes of errors that may occur during data transmission.

Cause of reception error	Reference section	
A timeout occurred for the transmission monitoring time (timer 2)	User's Manual (Application)	Section 6.3
Designated number of transmission data was larger than the size that could be stored in the transmission area	Section 6.2.2	

(1) Confirmation using the sequence program

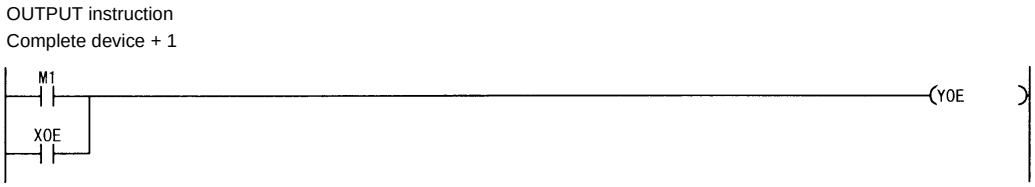
(a) Detecting a transmission error

1) The following device and input signal turn ON.
   • OUTPUT instruction complete device + 1
   • ERR LED ON signal (XE/XF)
2) The transmission error code can be checked using the OUTPUT instruction control data ((S1) + 1).
   Or, it can be checked by reading the data transmission result storage area in the buffer memory (addresses 257H/267H).
   For details on how to check the error code contents and corrective actions, see Chapter 10.

(b) How to turn off the ERR LED and clear the error code (see Section 10.1.2)

1) To turn off only the ERR LED, write a "1" to the LED OFF request area (addresses 0H/1H) in the buffer memory.
2) To turn off the ERR LED and clear the error code, turn ON the ERR LED OFF request output signal (YE/YF).

(Example) To perform the ERR LED OFF and the error code clear on the CH1 side



(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a transmission error, the ERR LED lights up. (See Chapter 10.)
2) Confirmation using the GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 8.6.3 and 8.6.5.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 8.6.10.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 8.6.5.)
   - GX Developer buffer memory monitor function (monitors addresses 257H/267H)

POINT
When a transmission error occurs, the PLC CPU may not transmit all the designated data. It is recommended that data communications be performed by establishing a user arbitrary communication procedure that can check normal transmission by reception of a response to data transmission.

6.3 Data Communications Precautions

The following describes the precautions to be taken during non procedure protocol data communications.

(1) The Q series C24 transmission sequence initialization conditions

The initial status indicates the status where transmission has stopped and reception data has been discarded.
The Q series C24 transmission sequence initialization conditions are as follows.

1) When the power is turned on, the Reset switch on the CPU panel is operated, or the Q series C24 mode is switched
2) When the receive data was cleared.
3) When the CD signal was turned off when data communications were performed by setting CD terminal check enable during full-duplex communications through the RS-232 interface.

(2) Generation of framing error in external device

When nothing is transmitted from the Q series C24 to the external device through the RS-422 or RS-422/485 interface, a framing error may be generated by the noise etc, in the external device.
Send an arbitrary code to identify the head of the send data from the Q series C24 to the external device.
Before data communication check the Q series C24 interface specifications.

(3) Data communications with external device (computer, etc.) over a multidrop link

When the external device PLC CPU are connected by a 1:n multidrop link, each the Q series C24 receives the data transmitted by the external device.
With a multidrop link, receive data by user frame (*1).
If data is not received by user frame, a sequence program that ignores the receive data other than the receive data addressed to the local station by sequence program, including the data indicating the objective PLC CPU in the message, must be written.
(Sample message)

(Example)

STX	Space	Station No. 0	Station No. 2	Data length (BIN data)	Data	CR	LF
(02_H)	(20_H)	(32_H)	(32_H)			($0D_H$)	($0A_H$)

*1 See chapter 11 of User's Manual (Application)

(4) Retry processing for data reception errors

The data when reception error occurred is discarded and only the data for the normal reception is taken into the Q series C24. For this reason, the reception message may be missing data when an error occurs. To assure the correct transmission and reception of data it is recommended that a normal/error response message is received and a response message reception timeout check is conducted for data transmitted between the PLC CPU and the external equipment and that measures be taken when an error message is received or when an error timeout occurs, such as retransmitting the data (transmission retry).

7 DATA COMMUNICATION USING THE BIDIRECTIONAL PROTOCOL

Data communication using the bidirectional protocol is a function for sending/receiving any data using the message format and transmission control procedure for the Q series C24 bidirectional protocol between external devices and PLC CPUs.
Any external devices that can install application programs and transmit and receive data in accordance with the MELSEC PLC protocol can communicate with the PLC CPUs using the bidirectional protocol.

This chapter explains the basic transmission and reception methods when performing data communication using the bidirectional protocol.
Follow the procedure described in this chapter to create sequence programs for sending and receiving data for the PLC CPU.
Regarding the additional functions listed below for data communication using the bidirectional protocol, see the separate User's Manuals (Application)

- Reading receive data using interrupt programs
  (See Chapter 4 of Application)
- Sending/receiving data using ASCII data (ASCII-BIN conversion)
  (See Chapter 13 of Application)
- Sending/receiving data using transparent code designation
  (See Chapter 12 of Application)

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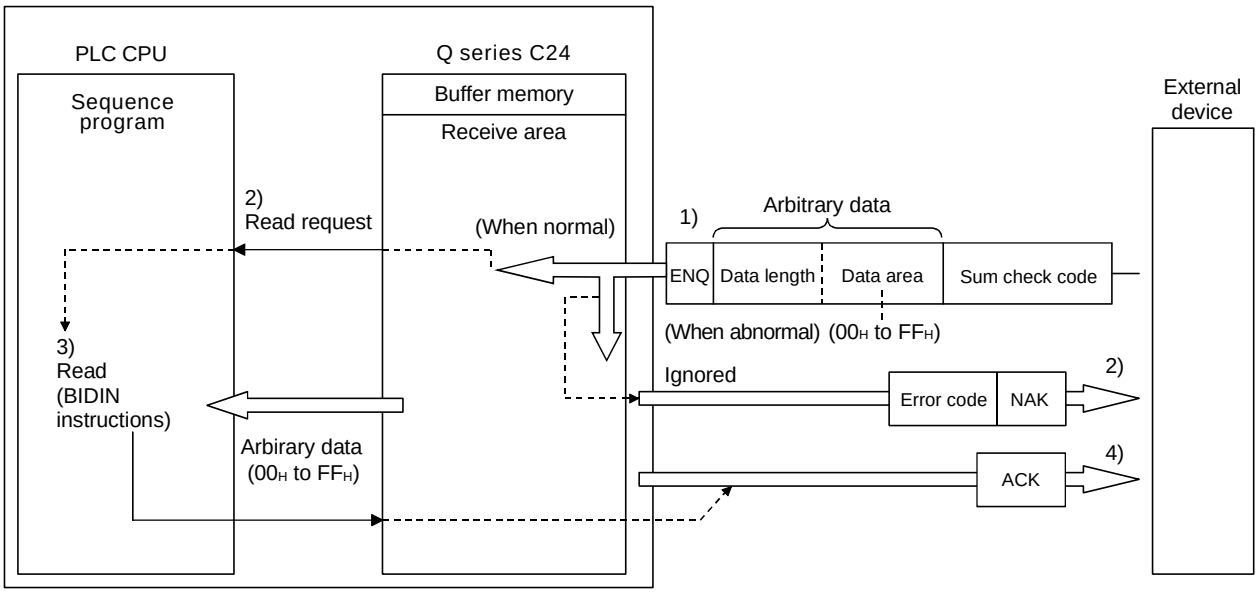
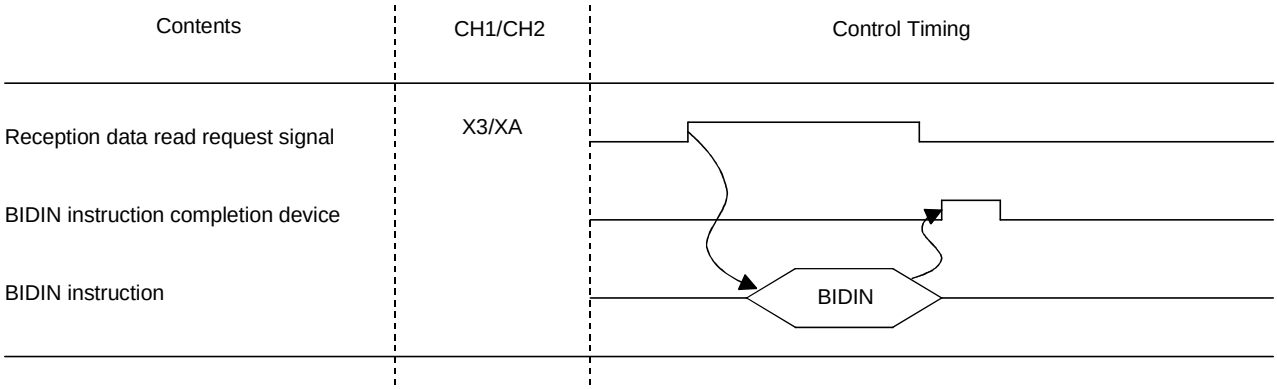
7.1 Data Reception from the External Device

This section explains the data reception from the external device.

7.1.1 Receiving methods

The following shows how to receive data sent from the external device using the bidirectional protocol. Since the size of each message received is recognized using the "data length" information contained in the message, messages of any size can be sent from the external device.





7 - 2

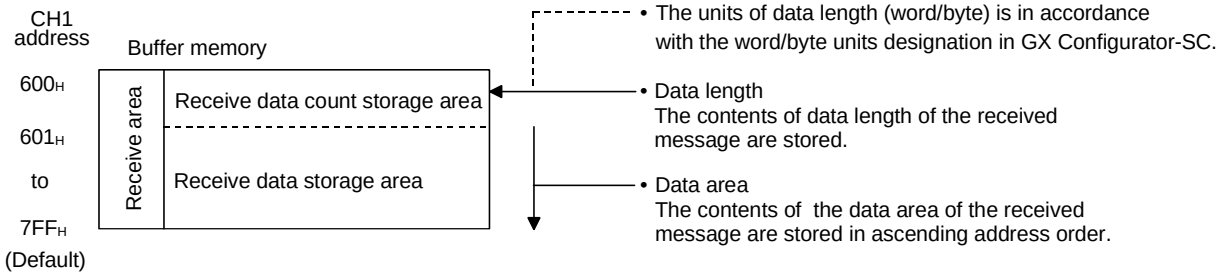
1) When the control code ENQ is received, the Q series C24 starts data reception processing.
   When the data specified by the data length is received, the Q series C24 ends the reception processing of that data.
   If "Sum check" is set with GX Developer, the Q series C24 checks whether the message is normal or abnormal using the sum check code received immediately after the message and the sum check code calculated by internal processing.
   ✻ If "No sum check" is set with GX Developer, messages are not checked using the sum check codes.
2) If the message has normally been received, the reception data read request signal (X3/XA) turns ON.
   ✻ If an error has been detected when receiving the message, the Q series C24 sends an abnormal end response (NAK message) to the external device.
   The reception data read request will not be sent to the PLC CPU.
   (The reception abnormal detection signal (X4/XB) does not come on.)
3) Control data is stored in the device designated with the BIDIN instruction and then the BIDIN instruction is executed.
   Receive data is read from the receive area of the buffer memory.
4) When the BIDIN instruction has been executed, the Q series C24 sends a normal end response (ACK message) to the external device.

7.1.2 Arrangement and contents of the receive area and the receive data

This section shows the arrangement and contents of the receive area and the receive data for performing data reception using the bidirectional protocol.

(1) Receive area

The receive area is a memory that stores the received data length (receive data count) and data area received from an external device.
The receive area is allocated to addresses 600_H to $7FF_H$ (CH1 side) and $A00_H$ to BFF_H (CH2 side) at initial setting.



POINT

(1) The position and size of the receive area in the buffer memory can be changed with GX Configurator-SC in accordance with the specifications of the external device and the received data length. (See Sections 8.4.5 and 8.4.7.)

(a) When changing the position and size of the receive area in the buffer memory with GX Configurator-SC, specify as follows:

1) Receive buffer memory head address designation
Designate the starting address for the area to be used as the receive area in the user definable area of the buffer memory (address: 400H to 1AFFH, 2600H to 3FFFH).

2) Receive buffer memory length designation
Designate by addresses the length of the area (0001H to 1A00H) to be used as the receive area in the user definable area of the buffer memory (address: 400H to 1AFFH, 2600H to 3FFFH).

(b) If the following functions are also used when the position and size of the receive area in the buffer memory are changed, make sure that the addresses of the receive area do not overlap with those for the buffer memory that stores the transmission and reception data to be used by these functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Communication data monitoring function

(2) When sending data to the Q series C24 from the external device, one of the following two adjustments should be made so that the relationship shown below is maintained.

1) Reduce the send data size.
2) Increase the receive area.

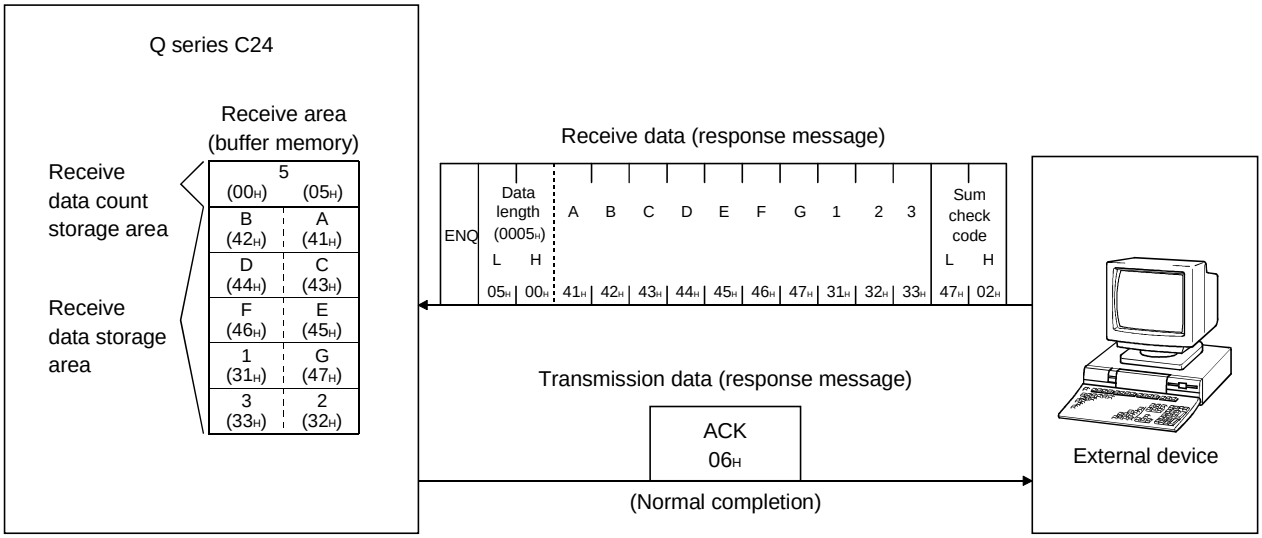
(Receive data storage area) $\geqq$ (Size of data portion sent from the external device)

7 - 5

(2) Arrangement of receive data

The following example illustrates the arrangement of data received from the external device when it is stored in the receive area.

1) The receive message is stored to the Q series C24 buffer memory (receive data storage area).
2) The data is stored to the receive data storage area in low address (L) → (H), next address (L) → (H) order.
   If the received data is "ABCDEFG123", it will be stored as shown below (for the CH1 side):



∗ When the data length unit is in bytes, 00H is stored in the higher byte of the last data storage position in the receive area when the data length of the message is an even byte.

(3) Contents of receive data

∗ The contents of receive data, including the receive data as indicated in Section 7.2.2, are explained below.

(a) Control codes

The types of control codes are shown in the table below.

Signal name	Code (hexadecimal)	Contents	Application
ENQ	05H	Enquiry	Code for starting data transmission.
ACK	06H	Acknowledge	Response code to the opposite side when data was received normally.
NAK	15H	Negative Acknowledge	Response code to the opposite side when data could not be received normally. (Error code is sent immediately after the response code.)

1) For data communication from the external device to the Q series C24 the Q series C24 checks and processes the control code received. It cannot be read from the sequence program.
2) For data communication from the Q series C24 to the external device The control code to be transmitted is added by the Q series C24.

(b) Data length

This indicates the number of bytes or words for the data portion of the message.

The unit of data length (words/bytes) is in accordance with the word/byte units designation in GX Configurator-SC.

1) For data communication from the external device to the Q series C24
The Q series C24 checks the length of the data received.
When the reception is normal, the Q series C24 stores the receive data in the receive data storage area of the Q series C24 buffer memory, assigning the first byte as the lower byte (L).
2) For data communication from the Q series C24 to the external device
The length of the transmission data is the number of the transmission data designated by the sequence program using the BIDOUT instruction.
The Q series C24 sends this value as is from the lower byte (L).

(c) Data portion

This consists of an array of original one-byte data to be transmitted to the external device side, which can handle 00_H to FF_H code data.

1) For data communication from the external device to the Q series C24
If the receive data portion is normal, the Q series C24 takes the codes as is and stores them in the receive data storage area in sequence, beginning with the youngest address.
The storage size is in accordance with the data length in the message (See item (b) above) and the word/byte units designation in GX Configurator-SC.
2) For data communication from the Q series C24 to the external device
The transmission data portion is the number of the transmission data designated by the sequence program using the BIDOUT instruction.
The Q series C24 sends the transmission data using the existing codes until the transmission data count is reached in accordance with the word/byte units designation in GX Configurator-SC to the transmission data designation area.

(d) Sum check code

The sum check code expresses the numeric value for the lower two bytes (16 bits) of the results (sum) from the addition of the data length and the data portion in the message as binary code data.

When "Sum check" is specified with the transmission setting in GX Developer, it is necessary to add a sum check code at the end of the message.

1) For data communication from the external device to the Q series C24

The Q series C24 checks and processes the sum check code received. It cannot be read from the sequence program.

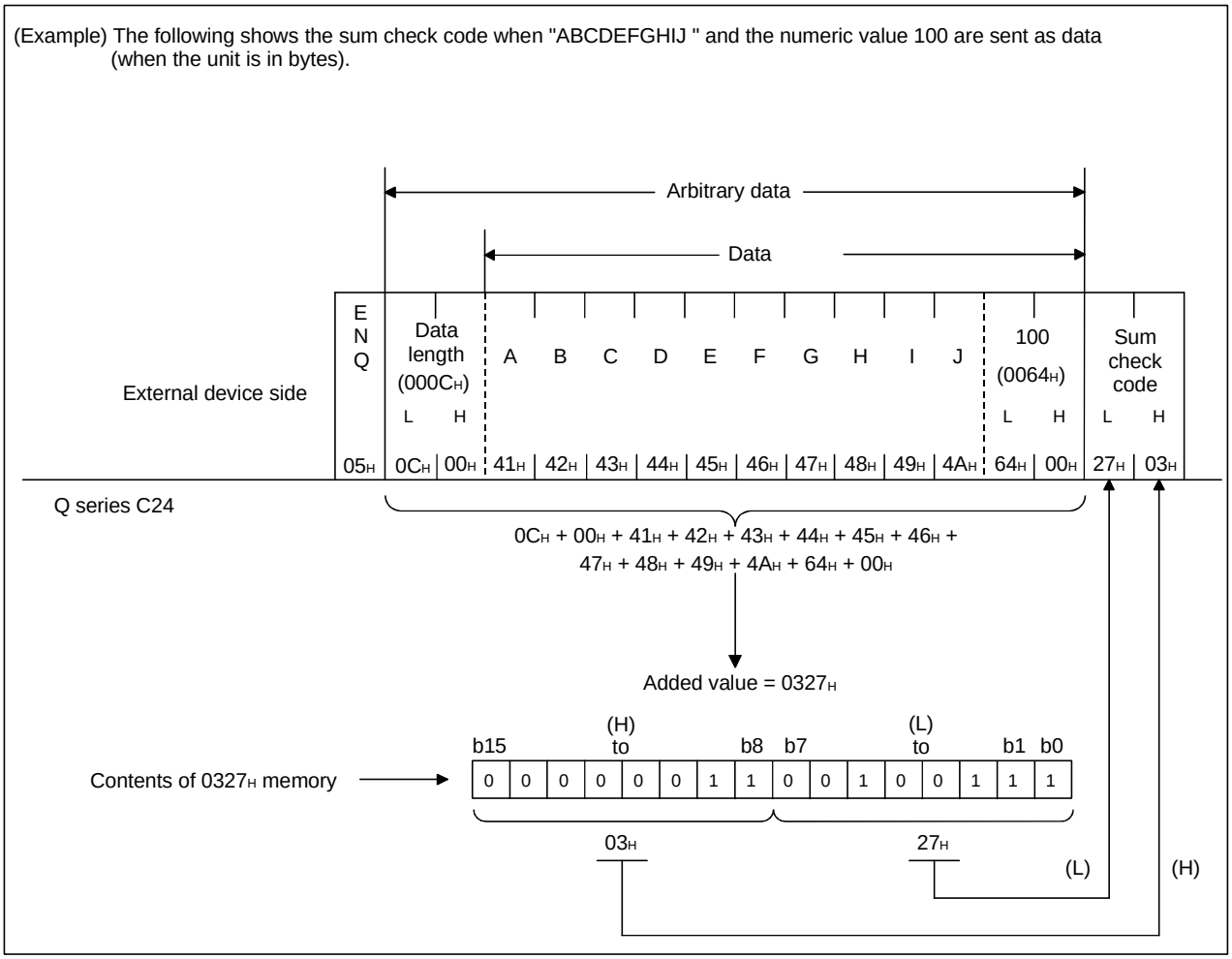
When "No sum check" is specified, once a data portion of message corresponding to the data length is received, the succeeding data received will be ignored up to the control code that follows (See (a)).

The following example shows the contents of a sum check code in the message.

2) For data communication from the Q series C24 to the external device

The sum check code to be transmitted is calculated and added by the Q series C24. When "No sum check" is specified, no sum check code is transmitted.

(Example) The following shows the sum check code when "ABCDEFGHIJ " and the numeric value 100 are sent as data (when the unit is in bytes).



(e) Error code

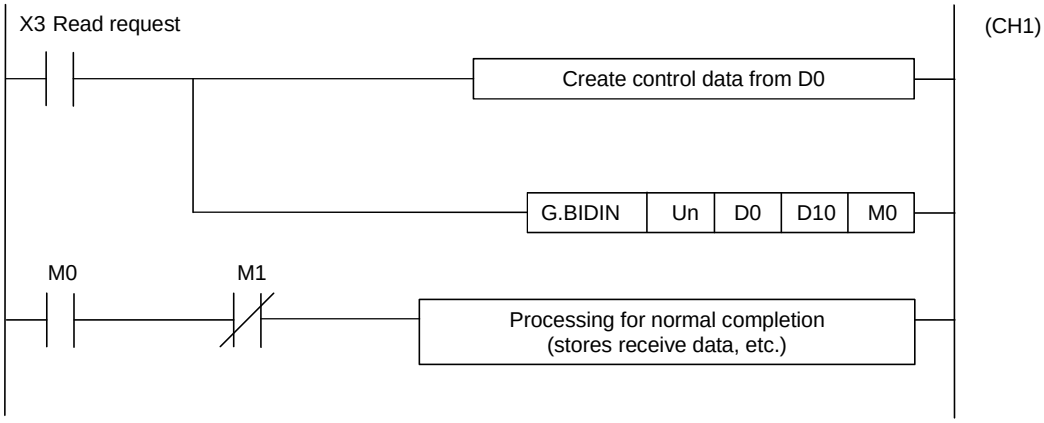
The error code indicates the definition of the error during NAK response. (For more details on the error codes, see Chapter 10.)

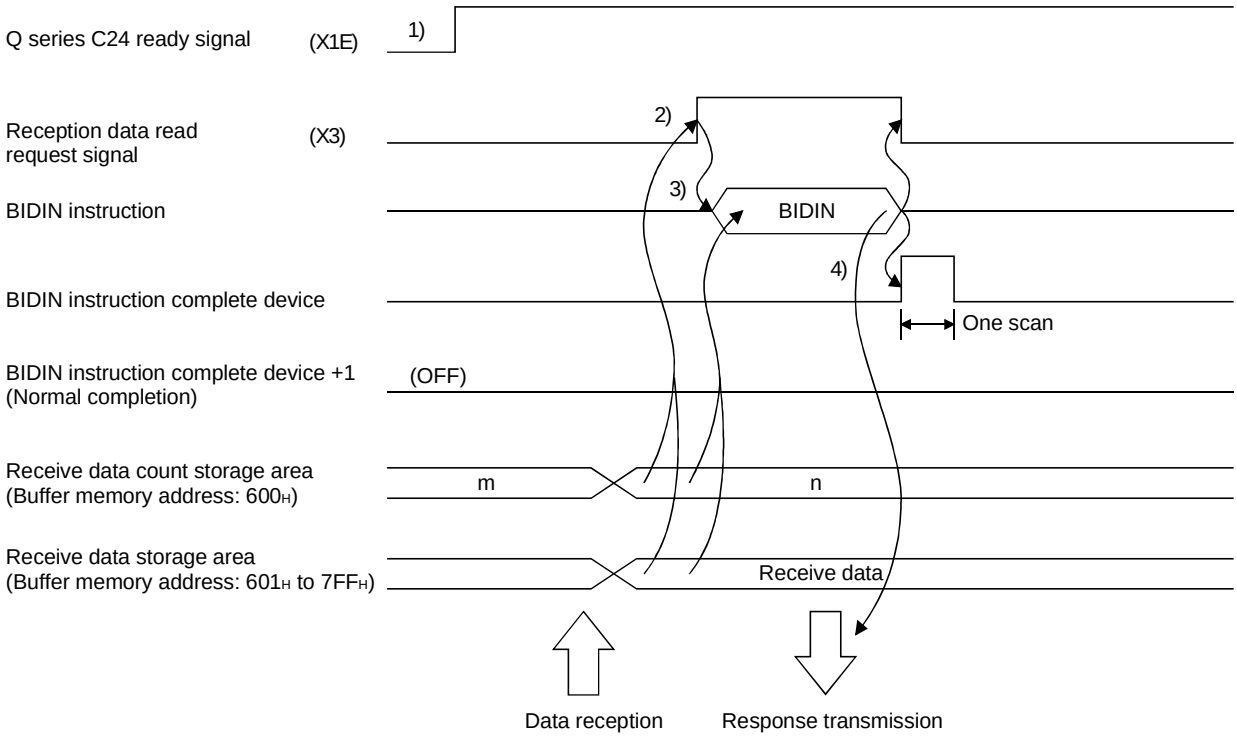
1) For data communication from the external device to the Q series C24
For error codes from the external device, transmit the codes specified by the user.
The error codes (0022_H to $005F_H$) that are not used by the Q series C24 can be used.
The Q series C24 stores the received error codes as a completion status in the control code for the BIDOUT instruction.
They are also stored in the data transmission result storage area in the buffer memory (address: 257_H).

2) For data communication from the Q series C24 to the external device
The error codes are added by the Q series C24.
When an error code is transmitted, the Q series C24 writes the same error code in the data reception result storage area of the buffer memory (address: 258_H).

7.1.3 Sequence program for data reception

This section explains the sequence program for data reception.
For details on the BIDIN instruction for data reception, see Chapter 9.

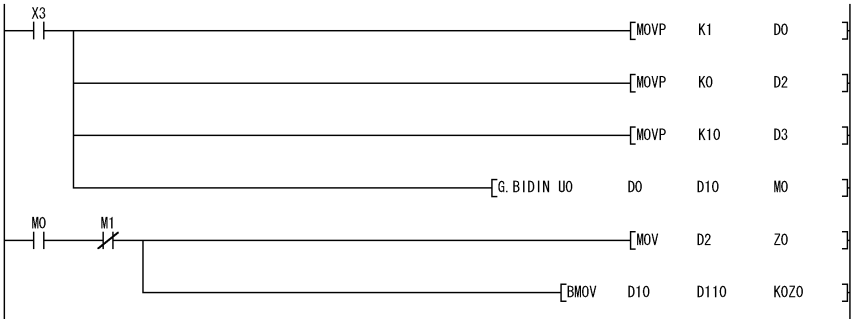




1) Start the local station PLC.
   The values specified with GX Developer are stored in the Q series C24.
2) When data is received from the external device, the reception data read request signal turns ON.
3) After the control data for the BIDIN instruction is stored in the device, the sequence program executes the BIDIN instruction and reads the receive data.
4) When the reading of receive data is completed, a response message (ACK message when the operation was completed normally) is sent and the device that has completed the BIDIN instruction turns ON.

(Program example)

When Q series C24 I/O signals are from X/Y00 to X/Y1F:



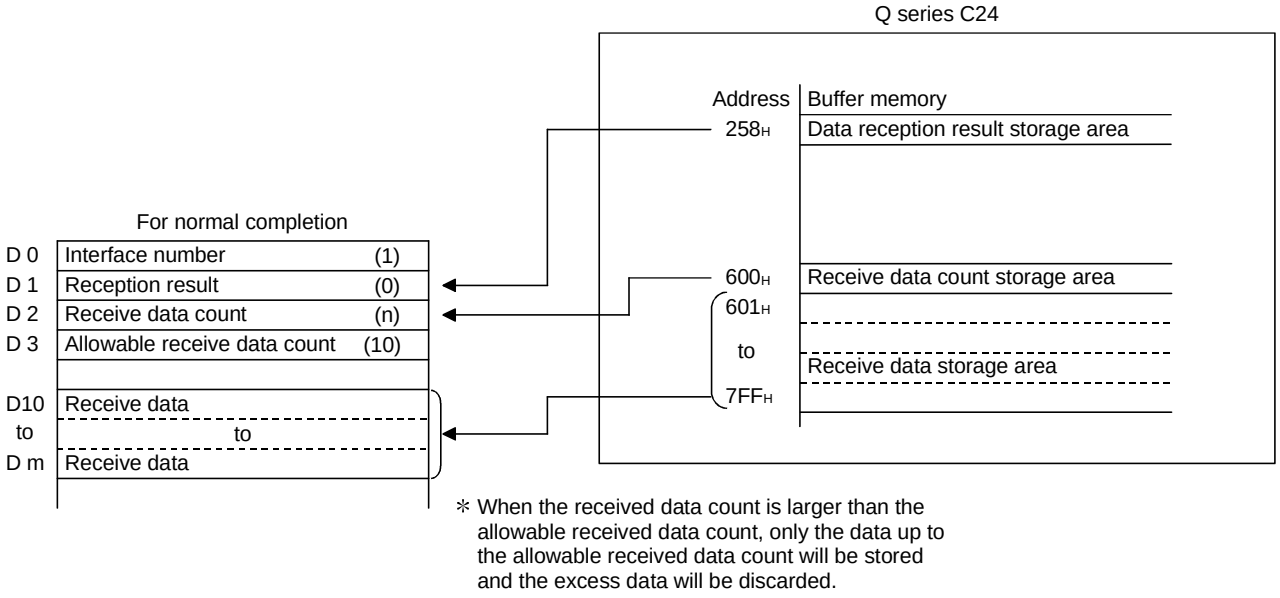
Designate the receive channel.

Clear the receive data count storage device to 0.

Designate the allowable receive data count.

With the normal completion, the receive data within the allowable receive data count (user designated) is read from the receive data storage area in the buffer memory.

- After the BIDIN instruction is executed, the user designated read completion signal (M0) comes on for 1 scan.
- The reading of received data is performed by the PLC CPU.



* When the received data count is larger than the allowable received data count, only the data up to the allowable received data count will be stored and the excess data will be discarded.

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POINT

(1) Receive data can also be read using interrupt programs.
For more details on reading receive data with interrupt programs, see Chapter 4 of the User's Manual (Application).
Note that if the reading of data received from the same interface is to be performed, it is not possible to combine the reading of data received by the main program and reading of data received by the interrupt program.
Accordingly, use one or the other of the above programs to read the data received.

(2) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 9.)

(3) More than one BIDIN instruction cannot be executed simultaneously.
Execute the next BIDIN instruction only after the execution of the first BIDIN instruction is completed.

(4) If the communication data count is set in byte units and the receive data count is an odd byte when requesting the reading of receive data to the PLC CPU, 00_H is stored in the higher byte of the final data storage position in the receive data storage area.

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7.1.4 How to detect reception errors

This section explains how to detect errors that may occur when receiving data from the external device.

The following items are considered as the primary causes of errors that may occur during data reception.

Cause of reception error	Reference section	
A transmission error occurred because of noise.	—	
A timeout occurred for the no-reception monitoring time (timer 0).	User's Manual (Application)	Section 6.1
A timeout occurred for the transmission monitoring time (timer 2)		Section 6.2
Data that could not be converted with the ASCII-BIN conversion was detected.		Chapter 13
Received the data length that was too long to store in the receiving area.	Section 7.1.2	
Simultaneous transmissions occurred.	Section 7.3	

(1) Confirmation using the sequence program

(a) Detecting the occurrence of a reception error

1) The single (XE/XF) is on when the ERR LED is on.
2) The receive error code is confirmed and read in the buffer memory data reception result storage area (address: 258H/268H).
For details on how to check the error code contents and corrective actions, see Chapter 10.

(b) How to turn off the ERR LED and clear the error code (see Section 10.1.2)

1) To turn off only the ERR LED, write a "1" to the LED OFF request area (addresses 0H/1H) in the buffer memory.
2) To turn off the ERR LED and clear the error code, turn ON the ERR LED OFF request output signal (YE/YF).
(Example) To perform the ERR LED OFF and the error code clear on the CH1 side

(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a transmission error, the ERR LED lights up. (See Chapter 10.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 8.6.3 and 8.6.6.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 8.6.10.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 8.6.6.)
   - GX Developer buffer memory monitor function (monitors addresses 258H/268H)

(3) Handling of receive data when a reception error occurs

1) All of the receive data for which an error was detected is ignored and an response message indicating an abnormal completion (NAK message) is sent to the external device.
   ✻ When an error is detected during message reception, the Q series C24 does not issue a reception data read request to the PLC CPU.
2) The receive area in the buffer memory will contain the data received normally just prior to the error occurrence. (Data will not be rewritten.)

7.1.5 Receive data clear

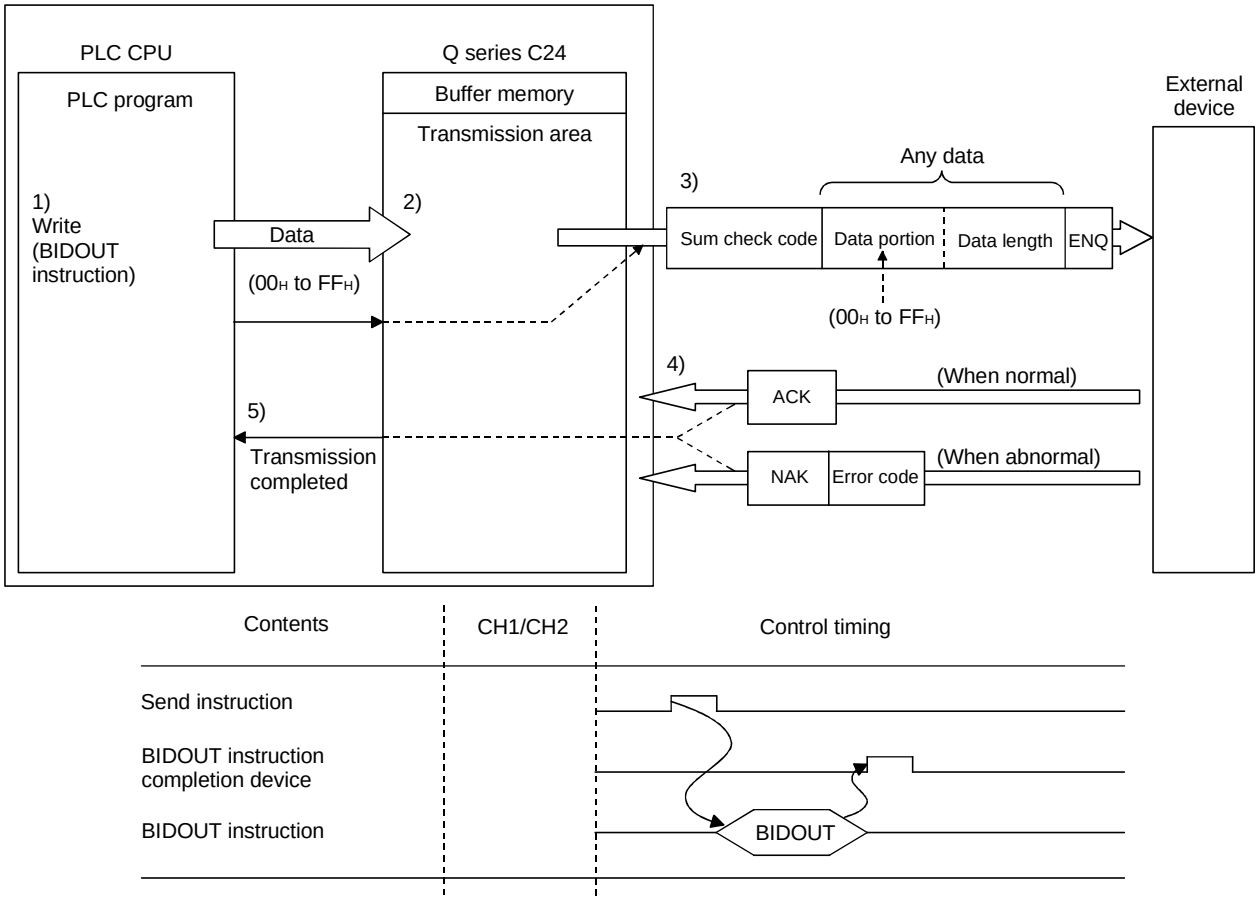
Data communications using the bidirectional protocol must be performed after a response message is received in reply to the preceding data transmission.
If the Q series C24 detects an error while receiving data, it sends an NAK message (response message) to the external device after the data reception completion and ignores the data being received when the error was detected.
Therefore, the receive data does not have to be cleared.

7.2 Sending Data to the External Device

This section explains data transmission from the PLC CPU to the external device.

7.2.1 Transmission methods

The following shows the method of sending data to the external device through data communication using the bidirectional protocol.



1) Data such as control data and transmission data are stored in the device designated with the BIDOUT instruction and then the BIDOUT instruction is executed.
2) The transmission data count and transmission data are written into the transmission area of the buffer memory.
3) The Q series C24 sends data by adding the control code ENQ at the beginning of the data.
   ＊ When "Sum check" is designated with GX Developer, the Q series C24 adds the sum check code calculated by internal processing to the end of the message and then transmits the message.
   When "No sum check" is designated with GX Developer, no sum check code is sent.
4) A response for the data transmission (for normal completion: ACK message; for abnormal completion: NAK message) is received.
5) The execution of the BIDOUT instruction completes with the transmission processing completion of the Q series C24.

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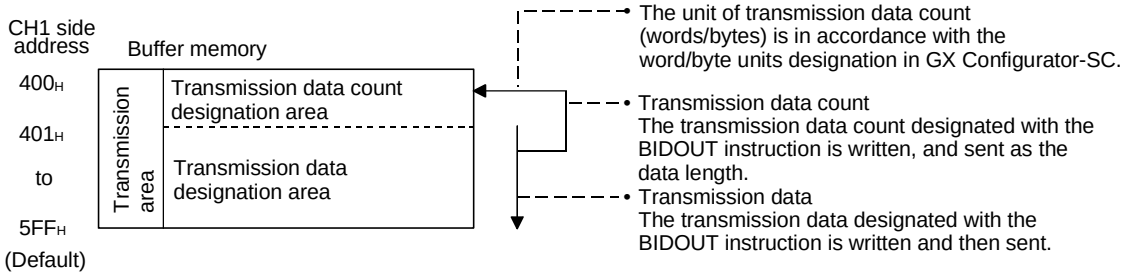
7.2.2 Arrangement and contents of the transmission area and the transmission data

This section explains the arrangement and contents of the transmission area and the transmission data for performing data transmission using the bidirectional protocol. For details on the contents of transmission data, see Section 7.1.2 (3).

(1) Transmission area

The transmission area is a memory area for storing the data and the data count that are transmitted from the PLC CPU to the external device via the Q series C24. By default, the transmission area is assigned to addresses 400H to 5FFH (CH1 side) and 800H to 9FFH (CH2 side).



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POINT

(1) The position and size of the transmission area in the buffer memory can be changed with GX Configurator-SC in accordance with the specifications of the external device and the transmission data length. (See Section 8.4.5.)

(a) When changing the position and size of the transmission area in the buffer memory with GX Configurator-SC, designate as follows:

1) Transmission buffer memory head address designation
Designate the starting address for the area to be used as the transmission area in the user definable area of the buffer memory (address: 400_H to $1AFF_H$, 2600_H to $3FFF_H$).
2) Transmission buffer memory length designation
Designate by addresses the length of the area (0001_H to $1A00_H$) to be used as the transmission area in the user definable area of the buffer memory (address: 400_H to $1AFF_H$, 2600_H to $3FFF_H$).

(b) If the following functions are also used when the position and size of the transmission area in the buffer memory are changed, make sure that the addresses of the transmission area do not overlap with those for the buffer memory that stores the transmission and receive data to be used by these functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Communication data monitoring function

(2) Set the size of data per data transmission from the PLC CPU to the external device to be smaller than the size of the transmission data designation area in the buffer memory.

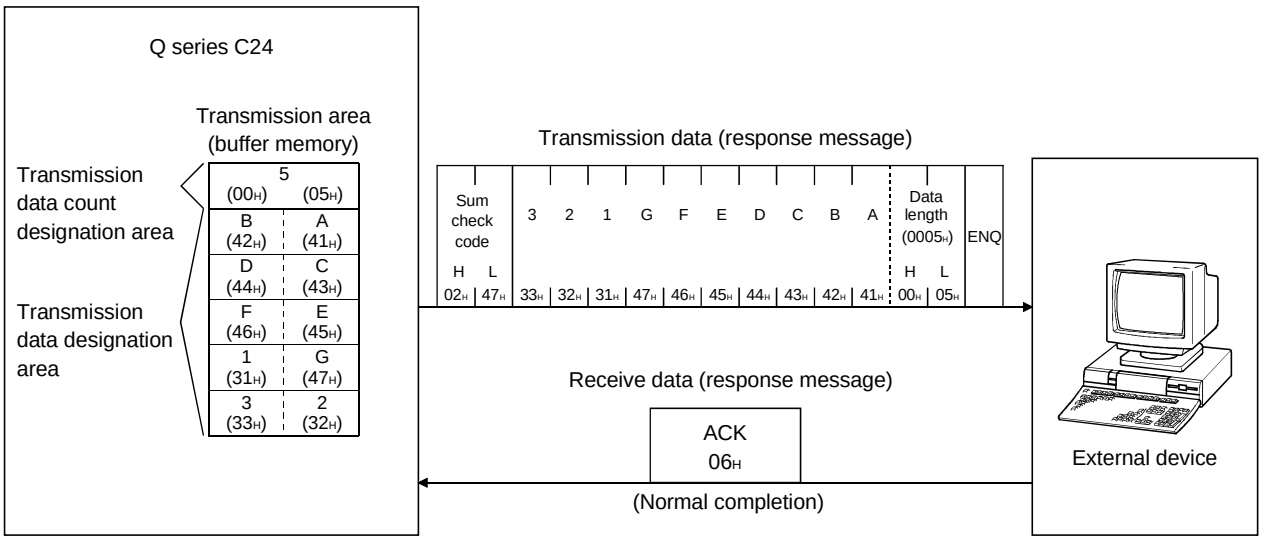
(Transmission data designation area) ≧ (Size of data portion to be sent from the PLC CPU)

To transmit data whose size is larger than the transmission data designation area, increase the transmission area, or divide the transmission data before sending.

(2) Transmission data arrangement

The following example shows an arrangement of the transmission data to be sent to the external device when storing it in the transmission area.

(Example) When "ABCDEFG123" is sent:



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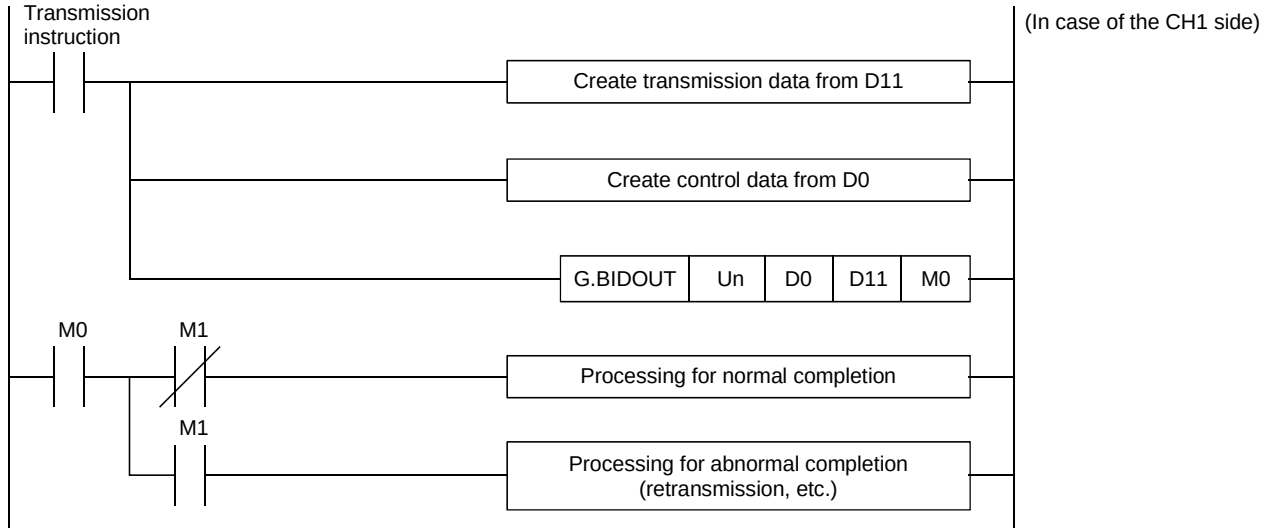
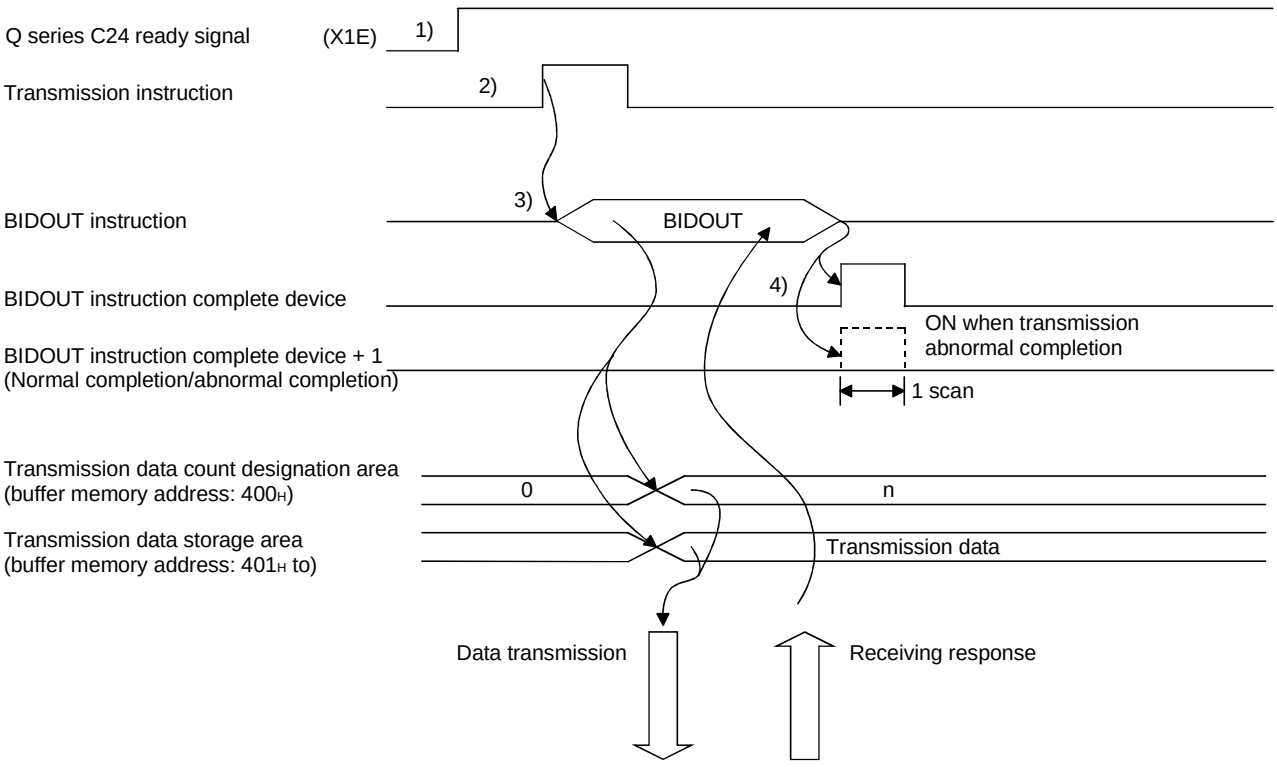
7.2.3 Sequence program for data transmission

A sequence program for data transmission is explained below.
For details on the BIDOUT instruction for data transmission, see Chapter 9.





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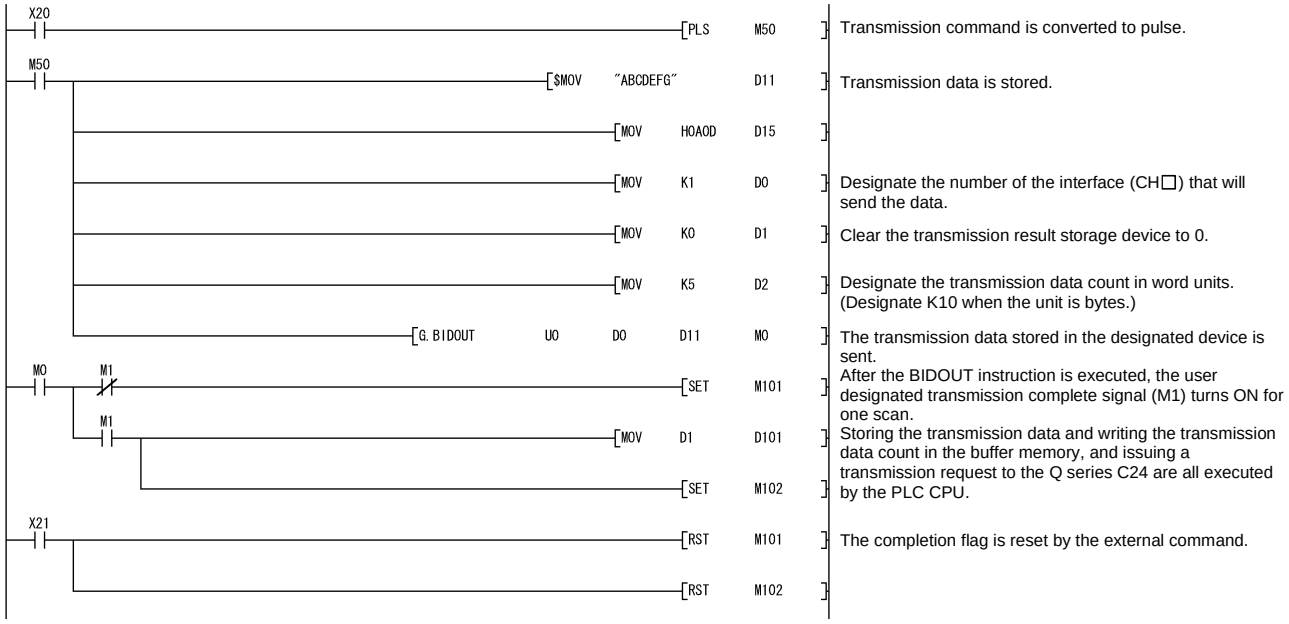
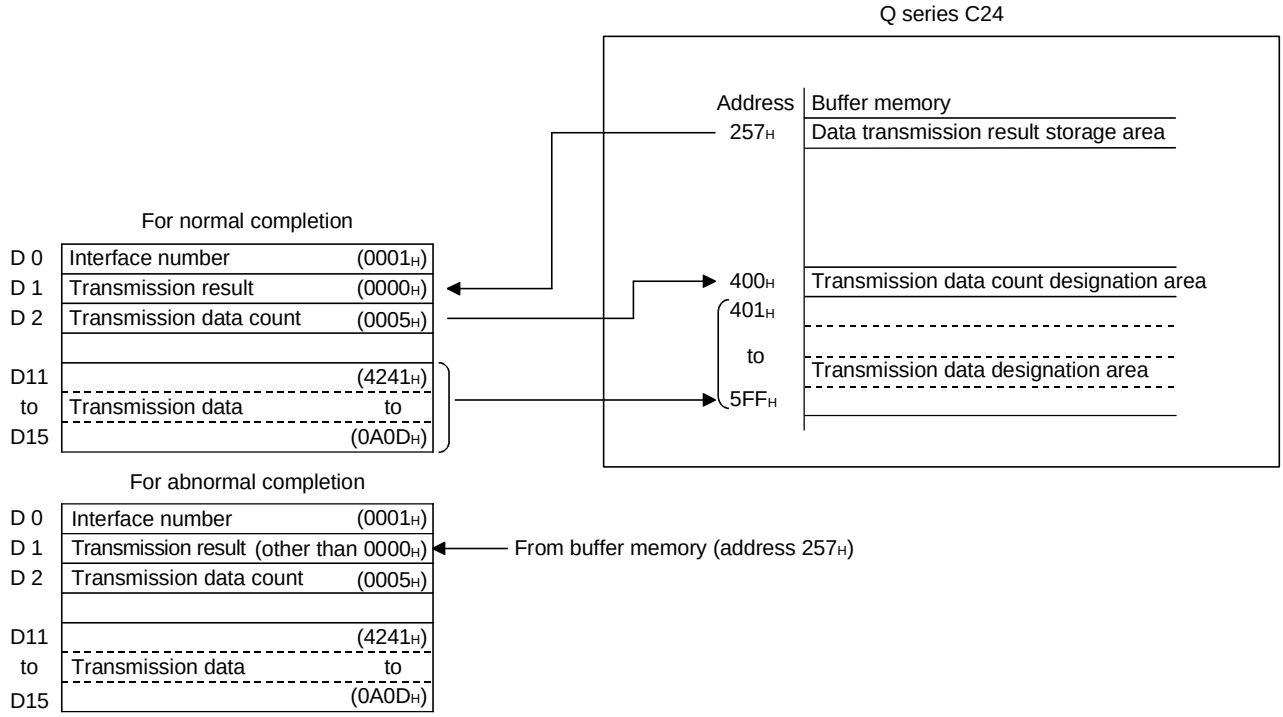
1) Starts the local station PLC.
   The setting values for GX Developer are stored in the Q series C24.
2) Inputs the user data transmission instruction signal.
3) Executes the BIDOUT instruction after storing the transmission data and the control data for the BIDOUT instruction in the device.
   Data is sent when the BIDOUT instruction is executed.
4) A response message for the data transmission (for normal completion: ACK message; for abnormal completion: NAK message) is received.
5) When the response is received, the Q series C24 transmission processing completes and the device that has completed the BIDOUT instruction turns ON.
   When the BIDOUT instruction ends abnormally due to the reception of an NAK message, the complete device +1 (abnormal completion signal) turns ON and the error code is stored in the control data completion status (S1+1).

(Program example)
When Q series C24 I/O signals are from X/Y00 to X/Y1F:





POINT
(1) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 9.)
(2) More than one BIDOUT instruction cannot be executed simultaneously. Execute the next BIDOUT instruction only after the execution of the first BIDOUT instruction is completed.

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7.2.4 How to detect transmission errors

This section explains how to detect errors that may occur when sending data to the external device.

The following items are considered as the primary causes of errors that may occur during data transmission.

Cause of transmission error	Reference section	
A transmission error occurred because of noise.	—	
A timeout occurred for the no-reception monitoring time (timer 0).	User's Manual (Application)	Section 6.1
A timeout occurred for the response monitoring time (timer 1).		Section 6.2
A timeout occurred for the transmission monitoring time (timer 2)		Section 6.3
Data that could not be converted with the ASCII-BIN conversion was detected.		Chapter 13
Designated the transmission data count that exceeded the transmission area size.	Section 7.2.2	
Simultaneous transmissions occurred.	Section 7.3	

(1) Confirmation using the sequence program

(a) Detecting a transmission error

1) The following device and input signal turn ON.
   • BIDOUT instruction complete device + 1
   • ERR LED ON signal (XE/XF)
2) The transmission error code can be checked using the BIDOUT instruction control data ((S1) + 1).
   Or, it can be checked by reading the data transmission result storage area in the buffer memory (addresses 257H/267H).
   For details on how to check the error code contents and corrective actions, see Chapter 10.

(b) How to turn off the ERR LED and clear the error code (see Section 10.1.2)

1) To turn off only the ERR LED, write a "1" to the LED OFF request area (addresses 0H/1H) in the buffer memory.
2) To turn off the ERR LED and clear the error code, turn ON the ERR LED OFF request output signal (YE/YF).
   (Example) To perform the ERR LED OFF and the error code clear on the CH1 side:

(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a reception error, the ERR LED lights up. (See Chapter 10.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 8.6.3 and 8.6.6.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 8.6.10.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 8.6.6.)
   - GX Developer buffer memory monitor function (monitors addresses 257H/267H)

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7.3 Processing when Simultaneous Transmission Performed During Full-Duplex Communications

This section explains the processing when simultaneous transmissions occur in full-duplex communication.

7.3.1 Processing when simultaneous transmissions occur

This section explains the processing performed by the Q series C24 when the external device and the Q series C24 transmit at the same time during data communications using the bidirectional protocol.
Since the external device and the Q series C24 do not transmit at the same time during half-duplex communications (see User's Manual (Application) Chapter 8), this section does not have to be read.

When an external device and the Q series C24 transmit at the same time, the Q series C24 processing depends on the setting of "Simultaneous transmission data valid/invalid designation" with GX Configurator-SC.

* The GX Configurator-SC setting value, "Simultaneous transmission data valid/invalid designation" is stored in the following areas of the buffer memory.
  Simultaneous transmission data valid/invalid designation area (addresses: $9B_H/13B_H$)
  The Q series C24 communication data processing for each setting is described in Section 7.3.2.

Setting contents with GX Configurator-SC	Value set to buffer memory (Address $9B_H/13B_H$)	Q series C24 processing contents	
		Message transmit processing	Message receive processing
Transmission data: Valid Receive data: Valid	0000_H	Waits to receive the response message (1)-2) while checking time-out after data transmission (1)-1) is complete. Posts normal end or abnormal end according to whether or not the PLC CPU received a response message through the buffer memory.	Transmits a response message (2)-2) after data reception (2)-1) is complete. Posts the receive data and receive result to the PLC CPU through the buffer memory.
Transmission data: Invalid Receive data: Valid	0100_H	Posts a simultaneous transmission error to the PLC CPU through the buffer memory after data transmission (1)-1). Does not wait for a response massage (1)-2) in reply to data transmission (1)-1).	Transmits a response message (2)-2) after data reception (2)-1) is complete. Posts the receive data and receive result to the PLC CPU through the buffer memory.
Transmission data: Valid Receive data: Invalid	0001_H	Waits to receive the response message (1)-2) while checking time-out after data transmission (1)-1) is complete. Posts normal end or abnormal end according to whether or not the PLC CPU received a response message through the buffer memory.	Ignores data reception (2)-1) and discards the received data. Does not transmit a response message (2)-2). Does not inform the PLC CPU that data was received.
Transmission data: Invalid Receive data: Invalid	0101_H	Posts a simultaneous transmission error to the PLC CPU through the buffer memory after data transmission (1)-1). Does not wait to a response massage (1)-2) in reply to data transmission (1)-1).	Ignored data reception (2)-1) and discards the receive data. Does not transmit a response message (2)-2). Does not inform the PLC CPU that data was received.

( )-m) is the number showing the correspondence with the messages in the illustration shown in Section 7.3.2.

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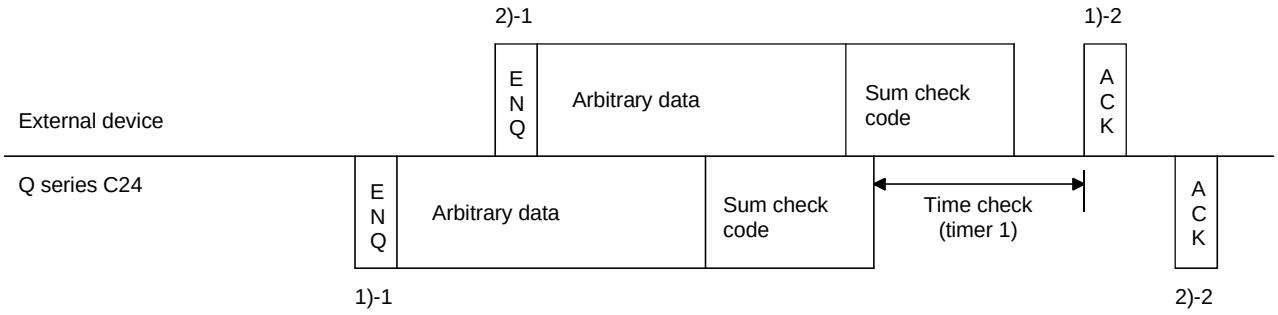
7.3.2 Communication data processing when simultaneous transmissions occur

Examples of the Q series C24 communication data processing for various settings of "Simultaneous transmission data valid/invalid designation" by GX Configurator-SC are explained.

(1) Transmission: valid, reception: valid

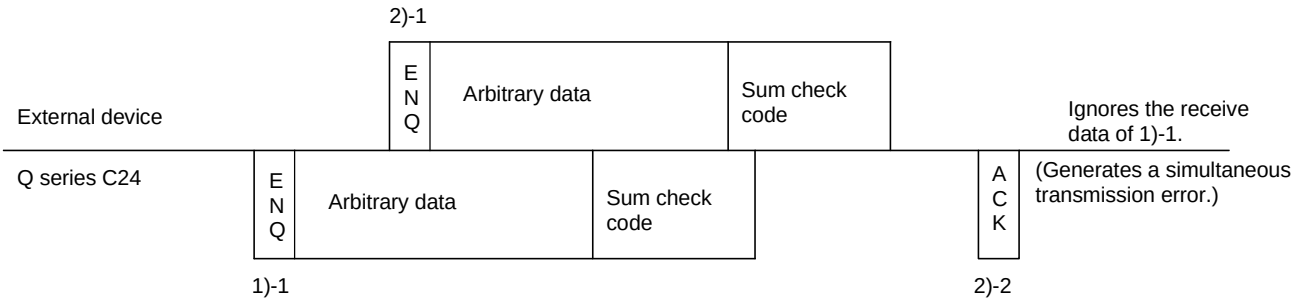


POINT

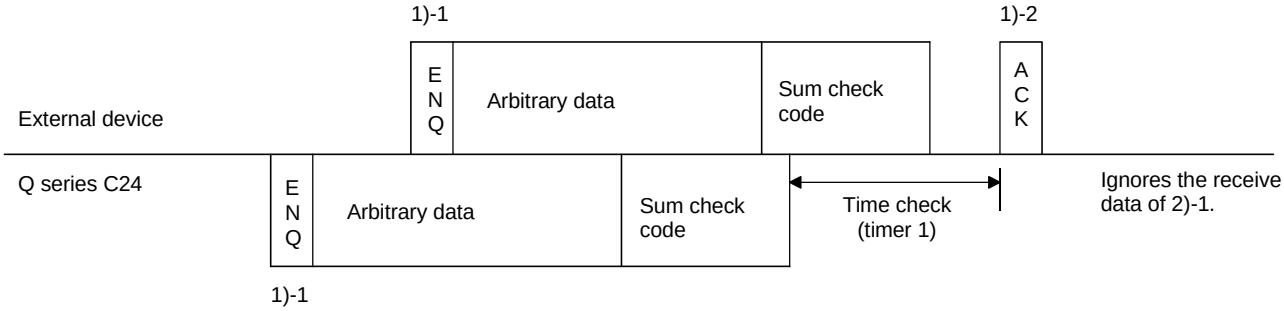
When the entire message of 2)-1 was received while transmitting the message of 1)-1 in the illustration.

- The Q series C24 outputs the receive data read request signal of 2)-1 to the PLC CPU after transmitting all 1)-1. (Turns on the X3/XA.)

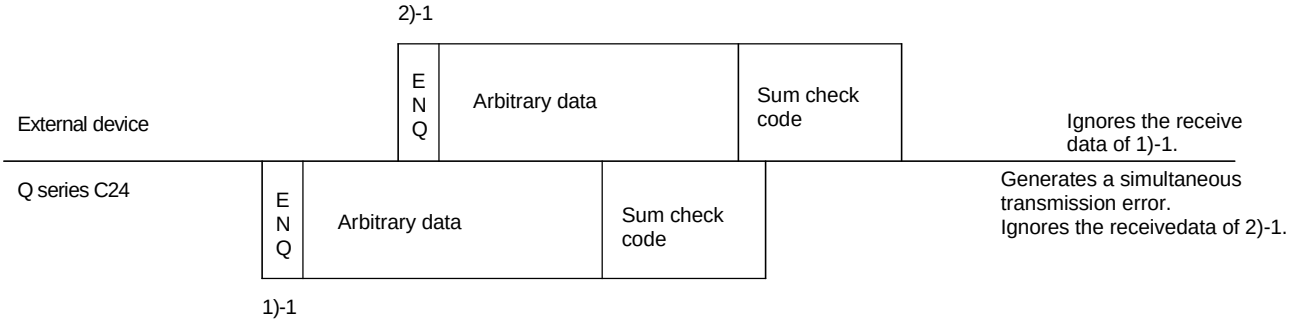
(2) Transmission: invalid, reception: valid



(3) Transmission: valid, reception: invalid



(4) Transmission: invalid, reception: invalid



REMARK

Time-check timer 1 (response monitoring time) shown in the illustration is described in Section 6.2 of User's Manual (Application).

POINT

When the transmission control (see Chapter 9 of User's Manual (Application)) is performed, and the simultaneous transmission data valid/invalid designation sets that the receive data is valid and transmission data is valid, the Q series C24 performs message transmission and message reception processing as described below.

During message transmission processing, time check by timer 1 (response monitoring time) is performed.

1) Message transmission (1)-1 in the illustration)
   - If the Q series C24 receives a terminate transmission request (DC3 received/DSR signal OFF) from the external device during message transmission, it terminates data transmission.
   - When the Q series C24 receives the ready to send signal (DC1 received/DSR signal ON), it restarts data transmission.
2) Message reception
   - If the Q series C24 cannot send a response message to the external device in response to message reception because the external device issued a terminate transmission request (DC3 received/DSR signal OFF), it transmits the response message after it receives the ready to send signal (DC1 received/DSR signal ON) from the external device.

7.4 Data Communications Precautions

The following shows the precautions when performing data communications using the bidirectional protocol.

(1) When the transmission sequence is in the initial status, it indicates that data transmission and reception processing has not been started.
The Q series C24 transmission sequence is initialized in the following cases.
- The power is turned on, the CPU is reset.
- When operating, or the mode is switched.
- When a response message (ACK, NAK, etc.) was received in reply to data transmission.
- When a response message (ACK, NAK, etc.) was transmitted in reply to data reception.
- When the CD signal was turned off during data communications using Check CD terminal in full-duplex communications through the RS-232 interface.

(2) As a data transmission procedure, data transmission from the external device or the Q series C24 should be performed after an response for the immediately preceding data transmission has been received.

(3) The external device and PLC CPU must agree so that the units of the data length (word count/byte count) in the message to be transmitted and received is the same.
The PLC CPU units can be set using the GX Configurator-SC word/byte units designation.
Make the length of the data area in the message to be transmitted and received the size of the Q series C24 buffer memory transmission data designation area and receive data storage area, or less.

(4) NAK code response
1) Response from the Q series C24 to external device
After the error detection message reception complete, it transmits the NAK code to the external device.
2) Response from external device to the Q series C24
Transmit the error code (0022_H to $005F_H$) immediately after the NAK response.

POINT

(1) Perform error processing according to the error code received immediately after the NAK message at the device that received NAK as the response message after data transmission.
Chapter 10 shows the error codes that are transmitted from the Q series C24.

(2) If the Q series C24 receives an NAK response while transmitting data to an external device, it completes data transmission, then reads the NAK, perform abnormal completion.

(3) If the Q series C24 detects an error while receiving data, it ignores the receive data corresponding to the data length.
If the data length is abnormal, the Q series C24 ignores all the data up to the receive message head data (ENQ, etc.) received thereafter.

(5) External device time-out check
When checking time-out up to reception of the response message at the external device during data transmission from external device to the Q series C24, make the time-out time the time shown below, or longer.
(PLC CPU maximum scan time × 2) + 100 ms

(6) External device framing error
When nothing is transmitted from the Q series C24 to the external device though the RS-422 or RS-422/485 interface, a framing error may be generated in the external device.
Make the external device skip the data up to transmission of the head data (ENQ, NAK, etc.) of the message from the Q series C24.
Before communicating data through the RS-422/485 interface, check Q series C24 specifications given in Section 3.3.

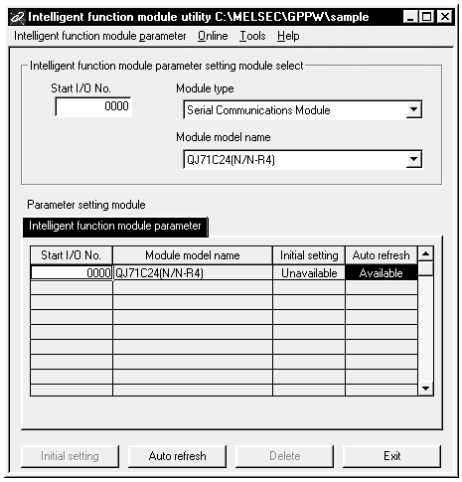
(7) Data bit settings
When adding a sum check code to a message, set the data bits to 8 bits using the transmission setting of the GX Developer.
For more details on the data bit settings, see Section 4.5.

8 UTILITY PACKAGE (GX Configurator-SC)

The GX Configurator-SC is a tool that supports the production of necessary PLC programs with initial setting, monitoring and testing, and data communication processing of the Q series C24.
The GX Configurator-SC is composed of an intelligent function utility and protocol FB support function.

(1) Intelligent function utility (utility package) (see this chapter)

The utility package facilitates the initial settings and monitoring of the Q series C24 by using dedicated screens without having to consider the I/O signals or buffer memory.
The utility package can also be used together with the GX Simulator (SWnD5□-LLT-E).



(2) Protocol FB support function

The protocol FB support function automatically generates the FB (function block) for communication that supports data communication processing and traces the network that monitors the data transmitted/received on the communication network.
By using the protocol FB support function, producing PLC programs and transmission debug is made easy.
For details on the protocol FB support function, see the GX Configurator-SC Operating Manual (Protocol FB support function).

8.1 Functions Available with Utility Package

The following table lists the utility package function.
(○ : indicates that the setting is valid with the applicable protocol.)

Function			MC	Non procedure protocol	Bidirectional protocol	Explanation page	Remarks
Auto refresh setting		Refresh the Q series C24's error codes and set devices on the PLC CPU side.	○	○	○	Section 4.6	Can be used via online operation. Can be used via offline operation.
User frame		Register the user frame in the flash ROM.	○	○	—	Section 8.4.1	
Data for modem initialization		Register the data for modem initialization in the flash ROM.	○	○	○	Section 8.4.2	
Data for modem connection		Register the data for model connection in the flash ROM.	○	○	○	Section 8.4.3	
Modem function system setting		Register the system setting values for model function in the flash ROM.	○	○	○	Section 8.4.4	
System setting	CHn Transmission control and others system setting	Set the transmission specifications with the other device. (DTR/DSR control, DC code control, communication method, data communication monitoring timer value, etc.)	○	○	○	Section 8.4.5	
	CHn MC protocol system setting	Assign the buffer memory for on-demand function, set the user frame number, etc.	○	—	—	Section 8.4.6	
	CHn Non procedure system setting	Assign the buffer memory needed to perform data communication using the non procedure protocol, and change the setting values, etc.	—	○	—	Section 8.4.7	
	CHn Bidirectional system setting	Assign the buffer memory needed to perform data communication using the bidirectional protocol, and change the setting values, etc.	—	—	○	Section 8.4.8	
	CHn PLC CPU monitoring system setting	Set the PLC CPU monitoring function.	○	○	—	Section 8.4.9	
	CHn Transmission user frame No. designation system setting	Set the user frame number to be transmitted, etc.	—	○	—	Section 8.4.10	
System setting default		Reset the setting values in the buffer memory to their default values.	○	○	○	Section 8.4.11	Can be used only via online operation.
System setting write		Write the setting values in the buffer memory to the flash ROM.	○	○	○	Section 8.4.11	
Flash ROM write allow/prohibit designation		Set whether to allow or prohibit writing to the flash ROM.	—	—	—	Section 8.4.12	
X · Y monitor/test		Perform the monitoring/testing of I/O signals to/from the PLC CPU.	○	○	○	Section 8.6.1	
Modem function monitor/test		Monitor the execution status of the modem function.	○	○	○	Section 8.6.2	
Monitor	CHn Transmission control and others monitor/test	Monitor the status of interface control signals, values set from the GX Developer, etc.	○	○	○	Section 8.6.3	
	CHn MC protocol monitor	Monitor the data communication result, I/O signal status, and setting values in the buffer memory.	○	—	—	Section 8.6.4	
	CHn Non procedure monitor/test		—	○	—	Section 8.6.5	
	CHn Bidirectional monitor		—	—	○	Section 8.6.6	
	CHn PLC CPU monitoring monitor	Monitor the setting values and operating status of the PLC CPU monitoring function.	○	○	—	Section 8.6.7	
	CHn User frame No. designation monitor for transmission	Monitor the setting value for user frame to be transmitted.	○	○	—	Section8.6.8	
Monitor/test others		Monitor the data reception result, error occurrence status, etc.	○	○	○	Section 8.6.9	
ERR LED off		Turn off the ERR LEDs on the front face of the module.	○	○	○	Section 8.6.10	
Non procedure protocol receive data clear		Clear the currently received data.	—	○	—	Section 8.7	

8.2 Installing and Uninstalling Utility Package

See "Method of installing the MELSOFT Series" attached with the utility package regarding the install and uninstall operation for the utility package.

8.2.1 Usage precautions

The following describes the precautions on using the utility package:

(1) Important safety information

Since the utility package is add-in software for GX Developer, read "Safety Precautions" and the basic operating procedures contained in GX Developer's Operating Manual.

(2) About installation

The GX Configurator-SC (utility package) is an add-in package for GX Developer Version 4 or later products.
Therefore, install GX Configurator-SC in a personal computer in which GX Developer Version 4 or a later product has been installed.

(3) About display screen errors while using the intelligent function module utility

There may be cases in which the screen will not properly display while the intelligent function module utility is being used, due to a lack of system resources. If this occurs, close the intelligent function module utility first and then GX Developer (program, comments, etc.) and other applications. Then, restart GX Developer and the intelligent function module utility.

(4) To start the intelligent function module utility

(a) In GX Developer, select "QCPU (Q mode)" for the PLC series and specify the project.
If anything other than "QCPU (Q mode)" is selected for the PLC series, or if the project is not specified, the intelligent function module utility will not start.

(b) Multiple intelligent function module utilities can be started.
However, the [Open file]/[Save file] intelligent function module's parameter operations can only be performed by a single intelligent function module utility. Other intelligent function module utilities can perform the [Monitor/Test] operation only.

(5) How to change screens when two or more intelligent function module utilities are started

When two or more intelligent function module utility screens cannot be displayed side by side, use the task bar to change the intelligent function module utility screen so that it is displayed on top of other screens.

(6) About the number of parameters that can be set in GX Configurator-SC

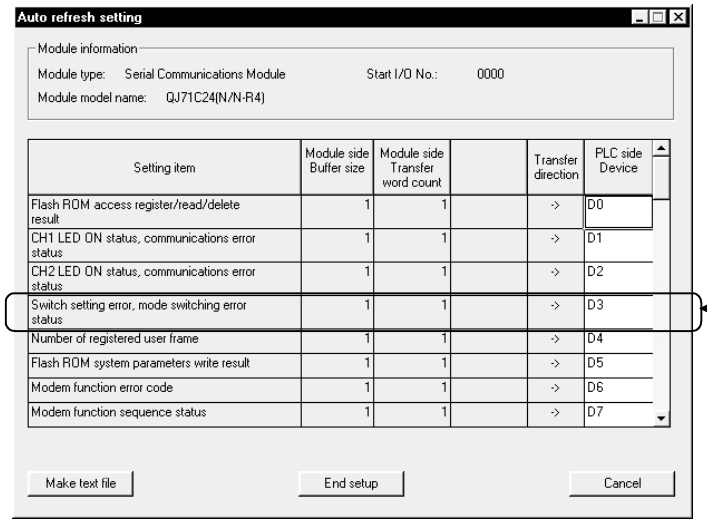
The number of parameters that can be set by the GX Configurator for an intelligent function module installed in the CPU module and in a remote I/O station of the MELSECNET/H network system is limited.

Intelligent function module installation object	Maximum number of parameter settings	
	Initial setting	Automatic refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q12PH/Q25PHCPU	512	256
MELSECNET/H remote I/O station	512	256

For example, if multiple intelligent function modules are installed in a remote I/O station, set the GX Configurator so that the number of parameter settings of all the intelligent function modules does not exceed the maximum number of parameter settings. The total number of parameter settings is calculated separately for the initial setting and for the automatic refresh setting.
The number of parameter settings that can be set for one module in the GX Configurator-SC is as shown below.

Object Module	Initial setting	Automatic refresh setting
QJ71C24N	0 (not used)	46 (Maximum number of settings)
QJ71C24N-R2	0 (not used)	47 (Maximum number of settings)
QJ71C24N-R4	0 (not used)	46 (Maximum number of settings)
QJ71C24	0 (not used)	46 (Maximum number of settings)
QJ71C24-R2	0 (not used)	47 (Maximum number of settings)

Example) Counting the number of parameter settings in the automatic refresh setting



The number of settings in this one line is counted as one setting.
The number of settings is not counted by columns.
Add up all the setting items in this setting screen, then add them to the total for the other intelligent function modules to get a grand total.

8.2.2 Operating environment

The operating environment of the personal computer where the GX Configurator-SC is used is explained.

Item		Peripheral devices
Installation (Add-in) destination ＊1		Add-in to GX Developer Version 4 (English version) or later ＊2
Computer main unit		Personal computer on which Windows® operates.
	CPU	Refer to the following table "Used operating system and performance required for personal computer".
	Required memory	
Hard disk free space	For installation	65 MB or more
	For operation	20 MB or more
Display		800 × 600 dot or more resolution ＊3
Operating system		Microsoft® Windows® 95 Operating System (English version) Microsoft® Windows® 98 Operating System (English version) Microsoft® Windows® Millennium Edition Operating System (English version) Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version) Microsoft® Windows® 2000 Professional Operating System (English version) Microsoft® Windows® XP Professional Operating System (English version) Microsoft® Windows® XP Home Edition Operating System (English version)

＊1: Install the GX Configurator-SC in GX Developer Version 4 or higher in the same language. GX Developer (English version) and GX Configurator-SC (Japanese version) cannot be used in combination, and GX Developer (Japanese version) and GX Configurator-SC (English version) cannot be used in configuration.

＊2: GX Configurator-SC cannot be used as an add-in with GX Developer Version 3 or earlier versions.

＊3: Setting fonts Size of Windows® for "Large Fonts" may cause the text to extend off screen. Therefore, choose "Small Fonts".

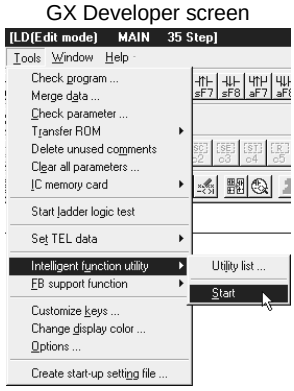
Used operating system and performance required for personal computer

Operating system		Performance Required for Personal Computer	
		CPU	Required memory
Windows® 95 (Service Pack 1 or later)		Pentium® 133MHz or more	32MB or more
Windows® 98		Pentium® 133MHz or more	32MB or more
Windows® Me		Pentium® 150MHz or more	32MB or more
Windows NT® Workstation 4.0 (Service Pack 3 or later)		Pentium® 133MHz or more	32MB or more
Windows® 2000 Professional		Pentium® 133MHz or more	64MB or more
Windows® XP Professional	"XP compatibility mode" and "Fast User Switching" are not supported.	Pentium® 300MHz or more	128MB or more
Windows® XP Home Edition		Pentium® 300MHz or more	128MB or more

8.3 Explanation of Utility Package Operation

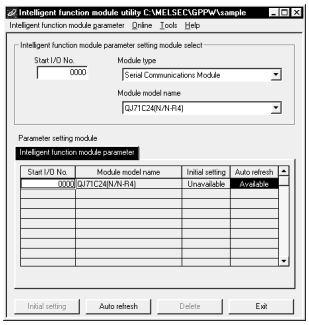
8.3.1 Operation overview

GX Developer screen



[Tools] – [Intelligent function utility] – [Start]

Intelligent Function Module
Select Parameter Setting Module screen



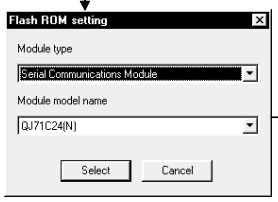
See Section 8.3.2

When used via online operation → 1) Go to next page

When auto refresh is set → 2) Go to next page

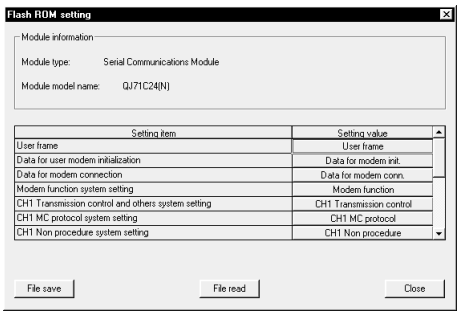
When used via offline operation

Select [Tools] – [Flash ROM stting] from the menu bar.



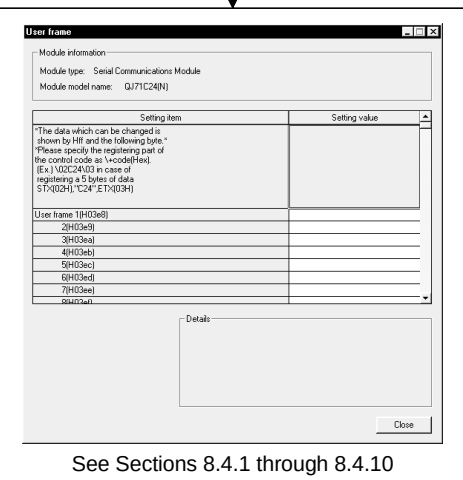
Select the module type and module model name.

Flash ROM settings screen



See Section 8.4

To each setting screen



See Sections 8.4.1 through 8.4.10

POINT

The following settings must be performed before starting the intelligent function module utility:

- Set the project using the GX Developer
- Set "QCPU (Q mode)" for the PC series.

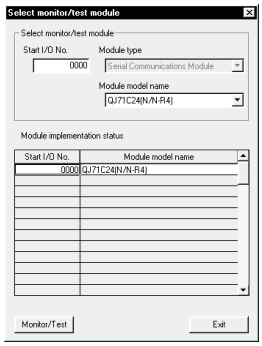
POINT

The various setting values to be registered in the Q series C24's flash ROM can be saved in a file of the PC via offline operation. Use online operation to write system setting values to the Q series C24.

1) When using online operation

Select [Online] – [Monitor/test] from the menu bar.

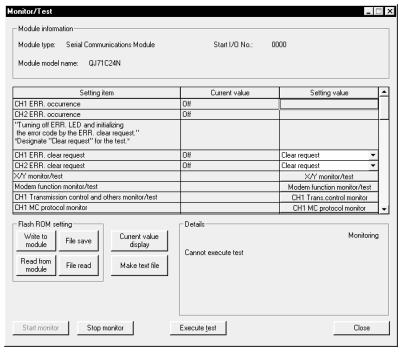
Select monitor/test module screen



Monitor/test

Select the parameter setting module for monitor/test.

Monitor/test screen



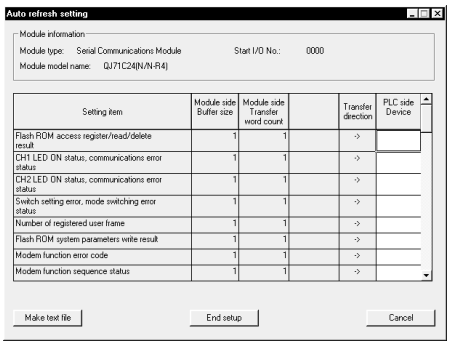
See Section 8.4
See Section 8.6

2) When setting auto refresh

Auto refresh

Enter "Start I/O No.," then select "Module type" and "Module model name."

Auto refresh screen



See Screen 4.6

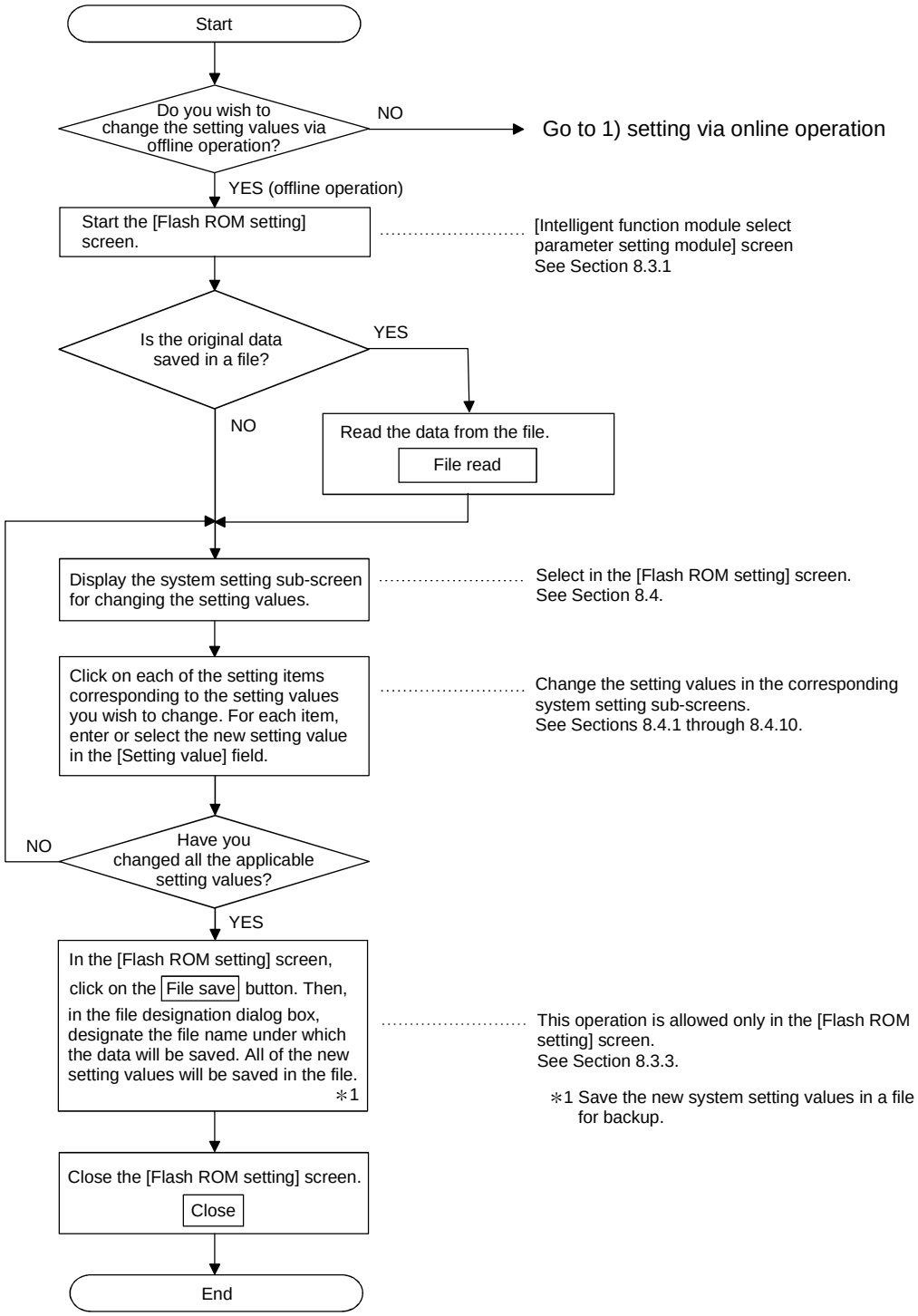
POINT

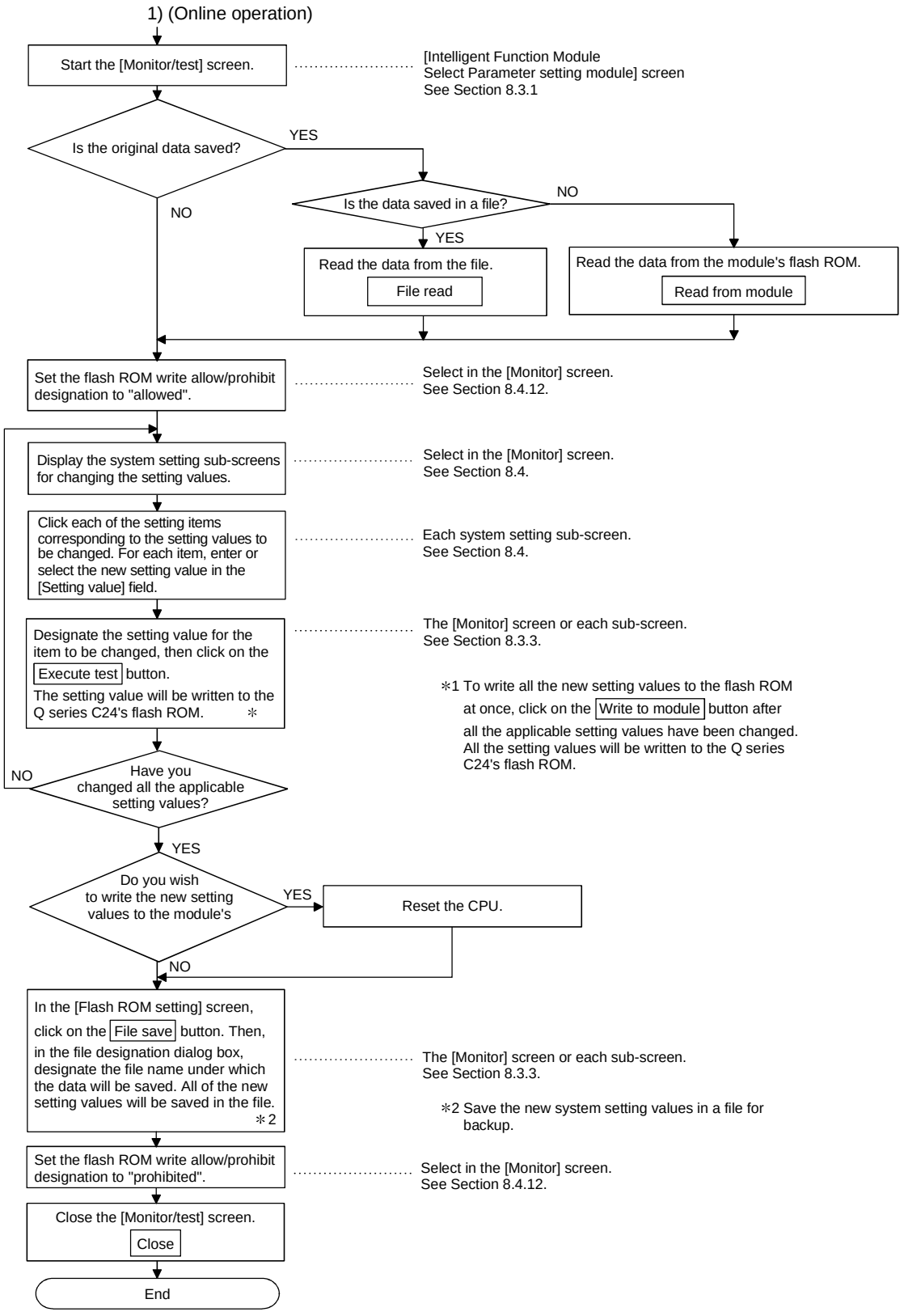
(1) When the setting operation is complete in each system setting screen, register the system setting data in the flash ROM, then restart the PLC CPU resume data transmission.

(2) With the Q series C24, monitoring, testing, and reading/writing of setting values can be performed via online operation.

REMARK

The following diagram illustrates the overview of a procedure in which the GX Configurator-SC is used to change the system setting values of the Q series C24 and save the new values to a file or write them to the Q series C24's flash ROM.




1) (Online operation)
Start the [Monitor/test] screen.
[Intelligent Function Module Select Parameter setting module] screen
See Section 8.3.1
Is the original data saved?
YES
NO
Is the data saved in a file?
NO
YES
Read the data from the file.
File read
Read the data from the module's flash ROM.
Read from module
Set the flash ROM write allow/prohibit designation to "allowed".
Select in the [Monitor] screen.
See Section 8.4.12.
Display the system setting sub-screens for changing the setting values.
Select in the [Monitor] screen.
See Section 8.4.
Click each of the setting items corresponding to the setting values to be changed. For each item, enter or select the new setting value in the [Setting value] field.
Each system setting sub-screen.
See Section 8.4.
Designate the setting value for the item to be changed, then click on the Execute test button.
The setting value will be written to the Q series C24's flash ROM. *
The [Monitor] screen or each sub-screen.
See Section 8.3.3.
*1 To write all the new setting values to the flash ROM at once, click on the Write to module button after all the applicable setting values have been changed. All the setting values will be written to the Q series C24's flash ROM.
NO
Have you changed all the applicable setting values?
YES
Do you wish to write the new setting values to the module's
YES
Reset the CPU.
NO
In the [Flash ROM setting] screen, click on the File save button. Then, in the file designation dialog box, designate the file name under which the data will be saved. All of the new setting values will be saved in the file. *2
The [Monitor] screen or each sub-screen.
See Section 8.3.3.
*2 Save the new system setting values in a file for backup.
Set the flash ROM write allow/prohibit designation to "prohibited".
Select in the [Monitor] screen.
See Section 8.4.12.
Close the [Monitor/test] screen.
Close
End

8.3.2 Starting the intelligent function module utility (displaying the [select parameter setting module] screen)

[Purpose]

Start the intelligent function module utility from the GX Developer, and display the module selection screen for the intelligent function module utility parameter setting. The screens that perform system setting, auto refresh setting, and monitoring/testing for the Q series C24 can be started from this module selection screen.

POINT
To start the Intelligent function module utility, a project created with the GX Developer whose PLC series is set as "QCPU (Q mode)" is required.

[Startup procedure]

[Tools] → [Intelligent function module utility] → [Start]

[Setting screen]

- Start I/O No.
  Enter the start I/O number for the applicable the Q series C24 using a hexadecimal expression.
- Module type
  Select [Serial communication module].
- Module model name
  Select the module model name of the applicable the Q series C24.
- Intelligent function module parameter setting module
  The modules for which parameters are set with the intelligent function module utility are displayed.
  Select the target module of your operation.

* It is not necessary to select [Intelligent function module, select parameter setting module] to perform monitor/test operation.

[Explanation of items]

(1) How to start each screen

(a) Starting the flash ROM setting screen
[Tools] → [Flash ROM setting] → "Module type" → "Module model Name" → Select

(b) Starting auto refresh settings
"Start I/O No." → "Module type" → "Module model name" → Auto refresh

(c) Monitor/test module selection screen
[Online] → [Monitor/test] → "Module selection" → Monitor/test

(2) Command buttons

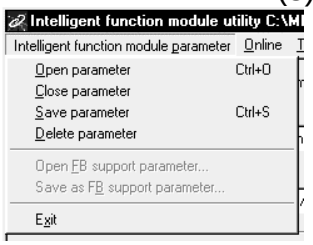
Initial settings : Cannot be selected.

Auto refresh : Starts the auto refresh setting screen.

Delete : Deletes the initial settings and auto refresh settings.

Exit : Closes the parameter setting module selection screen.

(3) Menu bar



(a) File items

The intelligent function module parameters for the project opened by GX Developer can be processed in file operation.

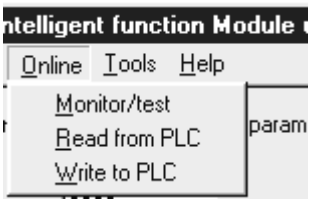
[Open parameter] : Reads the parameter file.

[Close parameter] : Closes the parameter file. If it has been modified, the file save confirmation dialog box appears.

[Save parameter] : Saves the parameter file.

[Delete parameter] : Deletes the parameter file.

[Exit] : Exits from the intelligent function module utility.

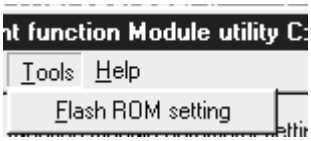


(b) Online items

[Monitor/test] : Starts the monitor/test module selection screen.

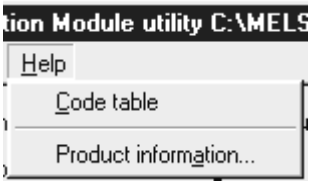
[Read from PLC] : Reads the intelligent function module parameters from the CPU module.

[Write to PLC] : Writes the intelligent function module parameters to the CPU module.



(c) Tool items

[Flash ROM setting] : Starts the flash ROM setting screen.



(d) Help items

[Code list] : Displays the ASCII code list. Use this list as reference when setting data.

[Product information] : Displays the version information of the intelligent function module utility.

POINT

(1) Saving the intelligent function module parameter files
Since files cannot be saved using the GX Developer project save operation, save the files on the module selection screen for parameter setting described above.

(2) Reading from and writing to PLC operations for the intelligent function module parameters using GX Developer
(a) After the intelligent function module parameters are saved in a file, they can be read from and written into the PLC.
(b) Set the target PLC using the GX Developer [Online] → [Transfer setup]. Only use the control PLC for the Q series C24 to write the intelligent function module parameters for a multiple CPU system to the PLC.
(c) Use the GX Developer for PLC reading or PLC writing the intelligent function module parameters at the remote I/O station.
GX Configurator-SC can not be used.

(3) Checking for the required utility
The head I/O is displayed in the Intelligent function module utility setting screen, but a "*" may be displayed for the model name.
This means that either the required utility is not installed or that the utility cannot be started from the GX Developer.
Check for the required utility in [Tools] - [Intelligent function utility] - [Utility list...] in GX Developer, and set it.

8.3.3 Performing common utility operations

This section explains how to perform the common operations in the data setting, auto refresh setting and monitor/test screens.

(1) Available Control Keys

The following table lists the special keys that can be used during operation of utility and their applications:

Name of key	Application
Esc	Cancels a newly entered value when entering data in a cell. Closes the window.
Tab	Moves between the controls in the window.
Ctrl	Used in conjunction with the mouse to select multiple cells in the selection test.
Delete	When a cell is selected, clears all set data.
Back space	Deletes the character where the cursor is positioned.
↑ ↓ ← →	Moves the cursor.
Page up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
Enter	Confirms the value entered in the cell.

(2) Operation Command Buttons

Current value display : Displays the current value of the selected item.

Make text file : Creates a text file (TXT format) under the specified file name and saves to it the contents currently displayed on the screen.

Start monitor : Starts monitoring of the current value field.

Stop monitor : Stops monitoring of the current value field.

Execute test : Registers the system setting data of the selected item in the flash ROM. ∗1

To apply Execute test to multiple items simultaneously, set the data for the corresponding items, select the multiple items while pressing down Ctrl, then click Execute test.

∗1 The settings for "receive data clear request" and "flash ROM write allow/prohibit designation" are written to the buffer memory.

Write to module : Registers all system setting data for the Q series C24 in the flash ROM.

Read from module : Reads all system setting data for the Q series C24 from the flash ROM.

File save	: Saves all system setting data for the Q series C24 to the designated file (extension: UMD).
File read	: Reads all system setting data for the Q series C24 from the designated file (extension: UMD).
Close	: Closes the currently displayed screen and returns to the previously displayed screen.
End setup	: Saves/writes the system setting data, closes the current screen, and returns to the previously displayed screen. * With offline operation, only [File save] and [File read] are enabled.

POINT

(1) When the setting operation is complete in each system setting screen, register the system setting data in the flash ROM, then restart the PLC CPU to resume data transmission.

(2) If two or more intelligent function module utility package are running, perform each operation after selecting the target utility package from the task bar and making it active.

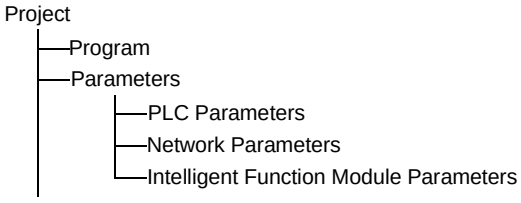
(3) When the menu screen for system registration to flash ROM (see Section 8.4) is closed, all the system setting data will be cleared. Before closing the screen, write the data to the module (enabled only via online operation) or save it to a file.

(3) Data/file to be created with utility package

The data and files shown below that are created with utility package are also used by GX Developer operation. Figure 8.1 shows an operation used to create data with utility package.

<Intelligent function module parameters>

(a) This data is created with the auto refresh settings, and stored in the intelligent function module parameter file of the project to be created using GX Developer.



(b) Steps 1) to 3) shown in Figure 8.1 are performed using the following operations.

1) Operating from GX Developer.
[Project] → [Open existing project] / [Save project] / [Save project as]
2) Operating from the utility parameter setting module selection screen.
[File] → [File read] / [File save]
3) Operating from the GX Developer.
[Online] → [Read from PLC / [Write to PLC] → "Intelligent function module parameters"
Or, operate from the utility parameter setting module selection screen.
[Online] → [Read from PLC] / [Write to PLC]

<Flash ROM data>

(a) The data set in [Flash ROM setting] can be saved in the desired directory separately from the GX Developer project.

(b) Operations 4) and 5) shown in Figure 8.1 are performed as follows:

4) This operation can be performed from the [Flash ROM setting] screen or [Monitor/test] screen.
[Flash ROM setting] screen → [File read]/[File save]
[Monitor/test] screen → [File read]/[File save]

5) This operation can be performed from the [Monitor/Test] screen of the utility.
[Monitor/test] screen → [Read from module]/[Write to module]

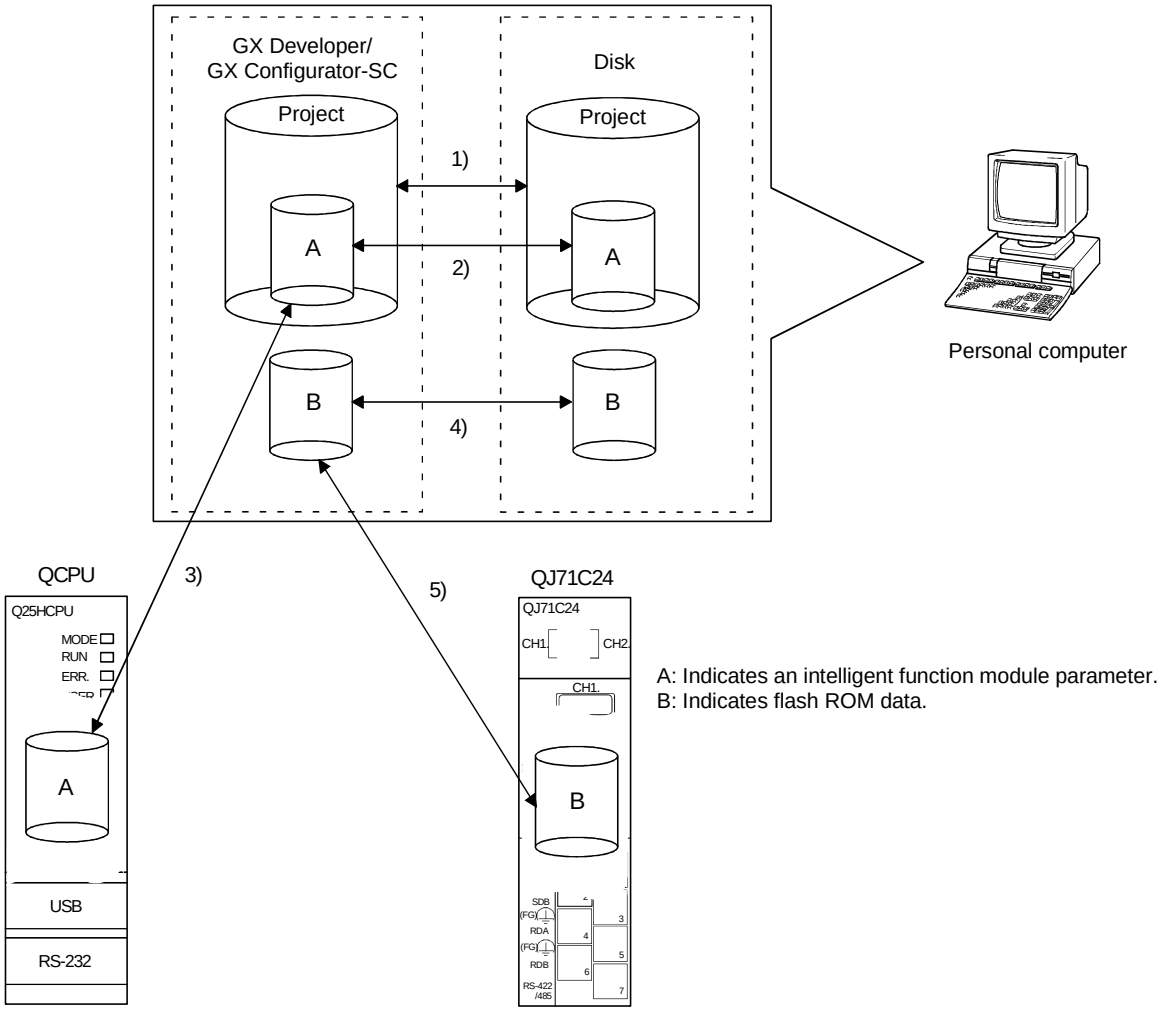


Figure 8.1 Correlation chart for data created by the utility package

8.4 System Registration to Flash ROM

[Purpose]

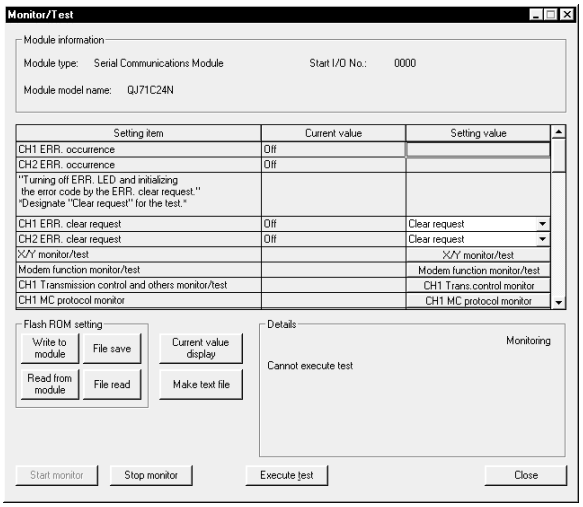
Display the menu screen for flash ROM registration, which is used to change the initial values set in the Q series C24's buffer memory.

[Startup procedure]

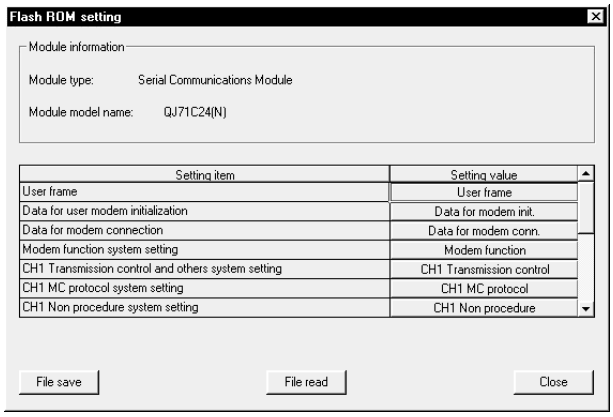
- Online operation
  - ∗ Startup from Intelligent function module utility
    (GX Developer Version 4 or later)
    [Online] → [Monitor/test] → "Select monitor/test module" → Monitor/test → [Monitor] screen
  - ∗ Startup from the system monitor (GX Developer Version 6 or later).
    [GX Developer] → [Diagnostics] → [System Monitor] → "Select the Q series C24 by installation status" → Diagnostics... → [Monitor] screen
- Offline operation
  [Tools] → Flash ROM setting → [Flash ROM setting] screen

[Setting screen]

Screen displayed during online operation (∗1)



Screen displayed during offline operation



∗1 The selection menus for system setting/registration are displayed by scrolling on the [Monitor] screen during online operation.
The selection buttons pertaining to flash ROM registration are displayed in blue on the screen.

[Setting Items]

The following table shows the selection menus for system setting/registration to be displayed:

Function	Section	Remarks
User frame registration	Section 8.4.1	Can be used via online operation. Can be used via offline operation.
Data for modem initialization registration	Section 8.4.2	
Data for modem connection registration	Section 8.4.3	
Modem function system setting	Section 8.4.4	
Transmission control and others system setting	Section 8.4.5	
MC protocol system setting	Section 8.4.6	
Non procedure system setting	Section 8.4.7	
Bidirectional system setting	Section 8.4.8	
PLC CPU monitoring system setting	Section 8.4.9	
Transmission user frame No. designation system setting	Section 8.4.10	
Resetting buffer memory/flash ROM setting values to default values	Section 8.4.11	Can be used only via online operation.
Flash ROM write allow/prohibit setting	Section 8.4.12	

POINT

(1) The User's Manual (Basic) and GX Configurator-SC's Help function provide the code list. Use this list as a reference.

(2) The values set in the respective setting screens explained in Section 8.4 can be written to the Q series C24 module (via online operation only) or saved to a file.

(3) Perform the following operations in advance to enable the registration of setting values in the flash ROM:
   (a) Switch setting using the GX Developer (see Section 4.5.2)
   Set "Setting change" under [Transmission settings] to "Enable" for both the CH1 and CH2 sides.
   (b) Setting using GX Configurator-SC (see Section 8.4.12)
   Set the flash ROM write allow/prohibit designation to "Allowed".

(4) Some system setting screens have a pair of screens: one for CH1 and the other for CH2. Please note that the explanations given in Section 8.4.1 and thereafter apply to the online operations performed in the CH1 screens.
The setting items are the same between CH1 and CH2, but different buffer memory addresses are used to store the setting values. The respective addresses are indicated as follows where applicable.
(Left side: address for the CH1 side, right side: address for the CH2 side)

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
DTR/DC control designation	93H/133H	Chapter 7 of User's Manual (Application)

(5) When a multiple CPU system is employed, GX Configurator-SC should be connected to the control PLC of the Q series C24, and the system setting data register in the flash ROM.
It is not possible to set target PLC to multiple CPU setting of "Transfer setup" of GX Developer and register the system setting data in the flash ROM.

8.4.1 User frame registration

[Purpose]

Register the user frame used in the following functions:

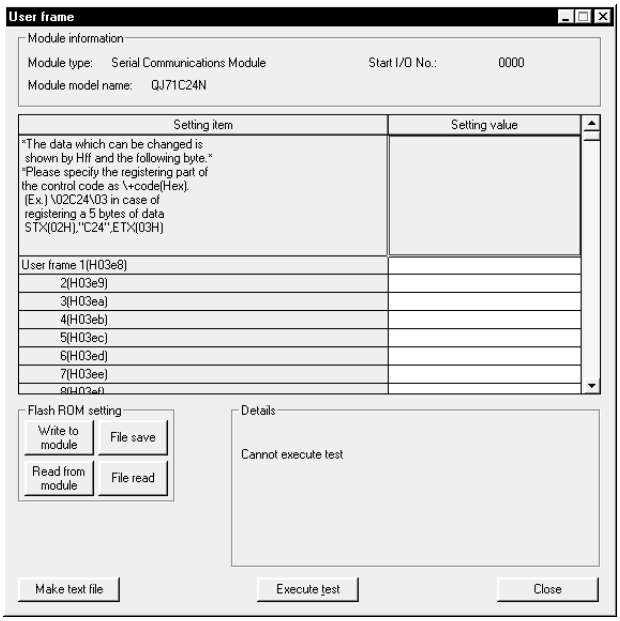
- On-demand function using the MC protocol.
- Data transmission/receive function using the non procedure protocol.

[Startup procedure]

- Online operation
  [Monitor] screen → User frame

- Offline operation
  [Flash ROM setting] screen → User frame

[Setting screen]



[Setting item]

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
User frame 1 to 200	—	Chapter 9 of User's Manual (Application)

REMARK

Use \ + code to specify hexadecimal numbers in the control code registration field if QSCU is used for registering a user frame.

(Example) To register the 5 bytes of data, STX (02H), "C24," and ETX (03H), specify the following:
\02C24\03

8.4.2 Data for modem initialization registration

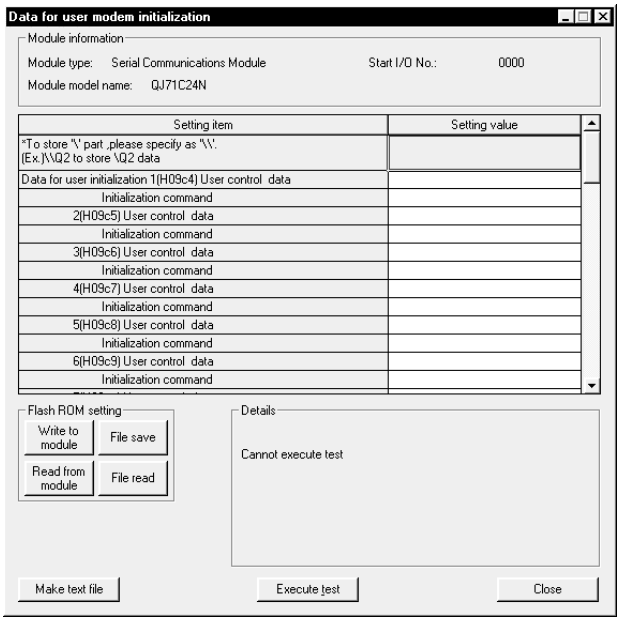
[Purpose]

Register the data for initializing the modem connected to the Q series C24.

[Startup procedure]

- Online operation
  [Monitor] screen → Data for user modem initialization
- Offline operation
  [Flash ROM setting] screen → Data for user modem initialization

[Setting screen]



[Setting item]

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
Data for user initialization 1 to 30 User control data	—	Chapter 3 of User's Manual (Application)
Data for user initialization 1 to 30 Initialization command		

REMARK

Use \\ code to specify a field to register "\" if GX Configurator-SC is used for data for modem initialization.
(Example) To register the \Q2 of data: \\Q2

8.4.3 Data for modem connection registration

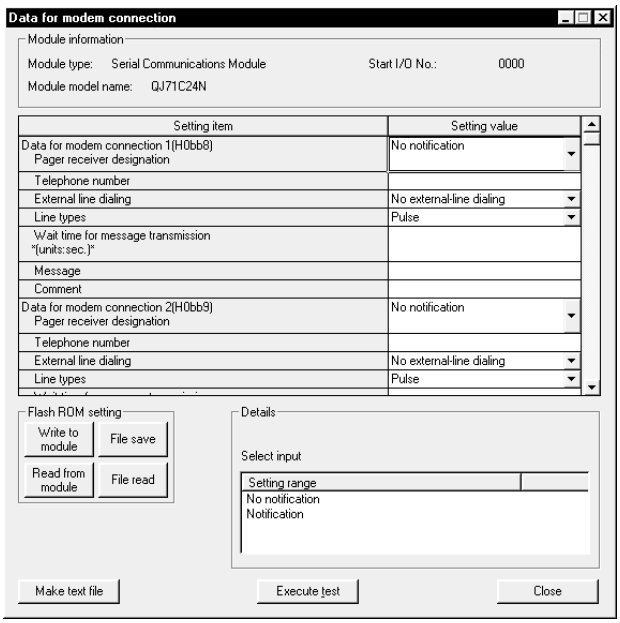
[Purpose]

For data communication and notification using the modem function, register the data for connection with external devices.

[Startup procedure]

- Online operation
  [Monitor] screen → Data for modem connection
- Offline operation
  [Flash ROM setting] screen → Data for modem connection

[Setting screen]



[Setting items]

Setting item		Setting value storage buffer memory address	Reference section containing detailed explanation
Data for modem connection 1 to 30	Pager receiver designation	—	Chapter 3 of User's Manual (Application)
	Telephone number		
	External line dialing		
	Line types		
	Wait time for message transmission units: s		
	Message		
	Comment		

8.4.4 Modem function system setting/registration

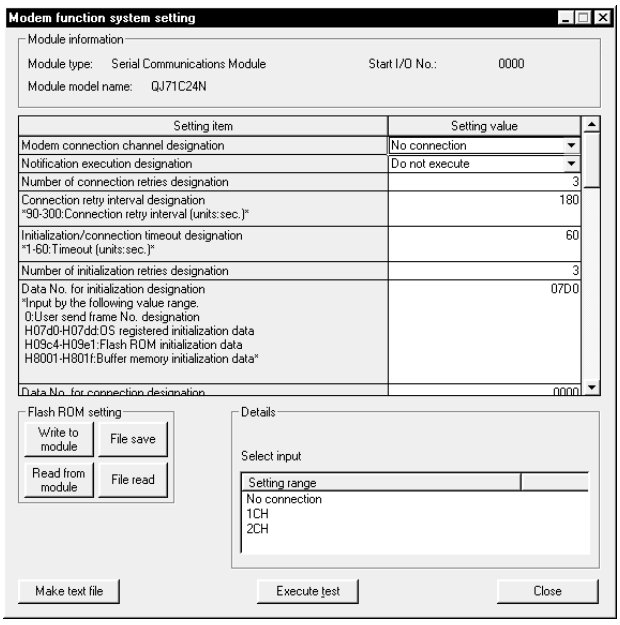
[Purpose]

For data communication using the modem function, register system setting values.

[Startup procedure]

- Online operation
  [Monitor] screen → Modem function system setting
- Offline operation
  [Flash ROM setting] screen → Modem function system setting

[Setting screen]



[Setting items]

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
Modem connection channel designation	2EH	Chapter 3 of User's Manual (Application)
Notification execution designation	2FH	
Number of connection retries designation	30H	
Connection retry interval designation ✻ units: s ✻	31H	
Initialization/connection timeout time designation ✻ units: s ✻	32H	
Number of initialization retries designation	33H	
Data No. for initialization designation	34H	
Data No. for connection designation	35H	
GX Developer connection designation	36H	
No-communication interval time designation ✻ units: min ✻	37H	
RS · CS control yes/no designation	38H	
Modem initialization time DR signal valid/invalid designation	2008H	
Wait time of notification ✻ units: s ✻	200AH	
Circuit disconnect wait time (PLC CPU watch use) ✻ units: s ✻	200EH	
Remote password mismatch notification count designation	200CH	
Remote password mismatch notification accumulated count designation	200DH	
Auto modem initialization designation	2007H	
Callback function designation	2001H	
Callback denial notification accumulated count designation	2002H	
Data No. for callback designation 1 to 10	2101H to 210AH	

8.4.5 Transmission control and others system setting

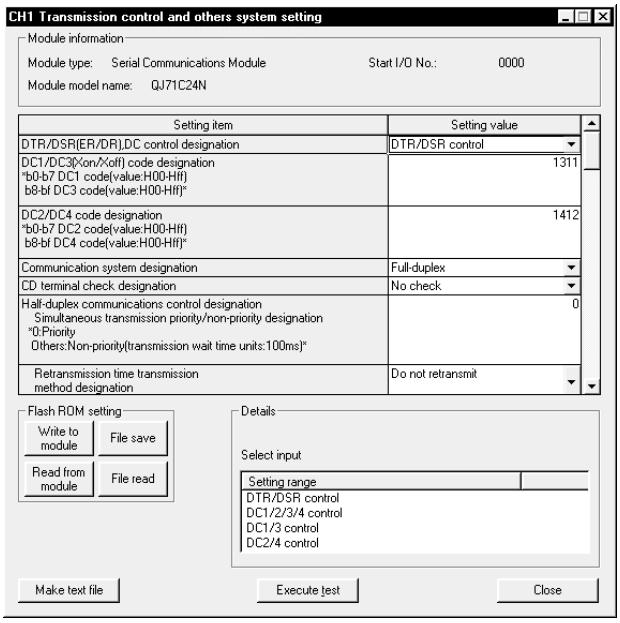
[Purpose]

For data communication with external devices, register system setting values for the transmission control method, monitoring time, and buffer memory assignment.

[Startup procedure]

- Online operation
  [Monitor] screen → CH□ Transmission control system setting
- Offline operation
  [Flash ROM setting] screen → CH□ Transmission control system setting

[Setting screen]



[Setting items]

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
DTR/DSR (ER/DR), DC control designation	93H/133H	Chapter 7 of User's Manual (Application)
DC1/DC3 (Xon/Xoff) code designation	94H/134H	
DC2/DC4 code designation	95H/135H	
Communication system designation	98H/138H	Section 3.2 of User's Manual (Basic)
CD terminal check designation	97H/137H	
Half-duplex communications control designation Simultaneous transmission priority/non-priority designation	99H/139H	Chapter 8 of User's Manual (Application)
Half-duplex communications control designation Retransmission time transmission method designation	9AH/13AH	
No-reception monitoring time (timer 0) designation	9CH/13CH	Chapter 6 of User's Manual (Application)
Response monitoring time (timer 1) designation	9DH/13DH	
Transmission monitoring time (timer 2) designation	9EH/13EH	
Word/byte units designation	96H/136H	Chapter 5 of User's Manual (Application)
RTS (RS) designation	92H/132H ⋯ b0	Section 3.2.1 of User's Manual (Basic)
DTR (ER) designation	92H/132H ⋯ b2	
Transmission control start free area	2012H/2112H	Chapter 7 of User's Manual (Application)
Transmission control end free area	2013H/2113H	
Send/Recv data monitoring designation	2018H/2118H	Chapter 16 of User's Manual (Application)
Action for buffer full	2019H/2119H ⋯ b0	
Stop by Timer 0 error	2019H/2119H ⋯ b2	
Monitor buffer head address	201AH/211AH	
Monitor buffer size	201BH/211BH	
Transmission buffer memory head address designation	A2H/142H	Chapters 6 and 7 of User's Manual (Basic)
Transmission buffer memory length designation	A3H/143H	
Receive buffer memory head address designation	A6H/146H	
Receive buffer memory length designation	A7H/147H	
Transmission transparent code designation 1st	11FH/1BFH	Chapter 12 of User's Manual (Application)
Transmission transparent code designation 2nd to 10th	2030H to 2038H/ 2130H to 2138H	
Receive transparent code designation	120H/1C0H	
ASCII-BIN conversion designation	121H/1C1H	Chapter 13 of User's Manual (Application)
Receive interrupt-issued designation	2010H/2110H	Chapter 4 of User's Manual (Application)

8.4.6 MC protocol system setting

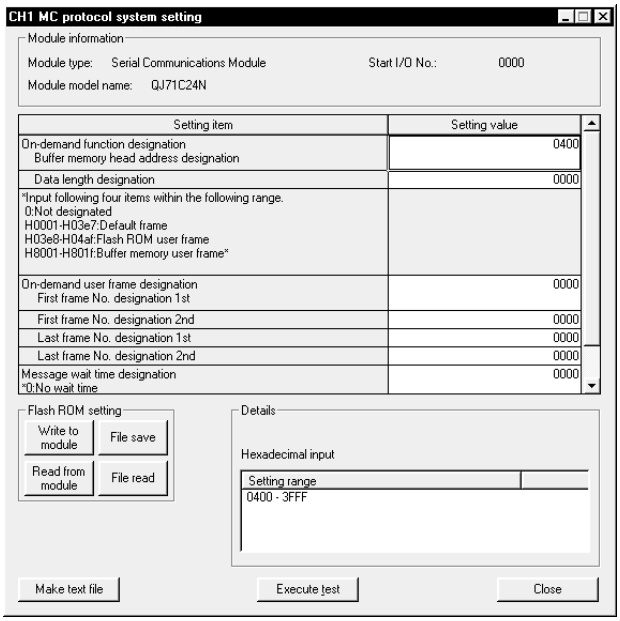
[Purpose]

For data transmission using the MC protocol, register system setting values.

[Startup procedure]

- Online operation
  [Monitor] screen → CH□ MC protocol system setting
- Offline operation
  [Flash ROM setting] screen → CH□ MC protocol system setting

[Setting screen]



[Setting items]

Setting item		Setting value storage buffer memory address	Reference section containing detailed explanation
On-demand function designation	Buffer memory head address designation	A0H/140H	Chapter 10 of User's Manual (Application)
	Data length designation	A1H/141H	
On-demand user frame designation	First frame No. designation 1st	A9H/149H	
	First frame No. designation 2nd	AAH/14AH	
	Last frame No. designation 1st	ABH/14BH	
	Last frame No. designation 2nd	ACH/14CH	
Message wait time designation waiting time ✻ units: 10 ms ✻		11EH/1BEH	

8.4.7 Non procedure system setting

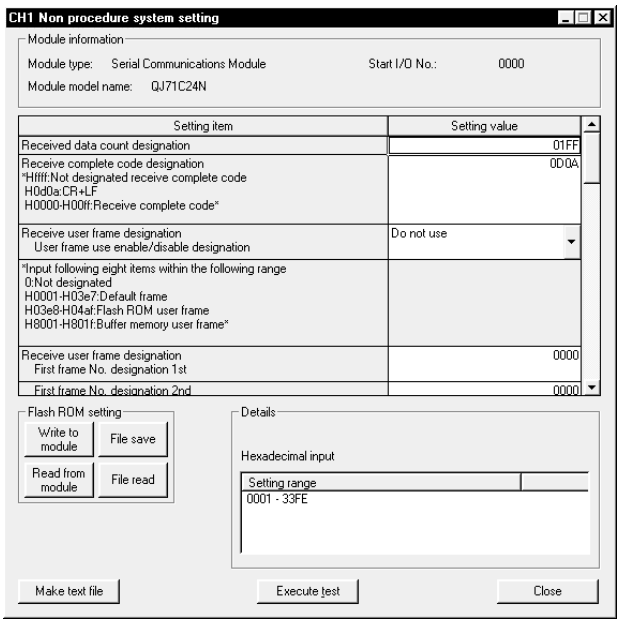
[Purpose]

For data transmission using the non procedure protocol, register system setting values.

[Startup procedure]

- Online operation
  [Monitor] screen → CH□ Non procedure system setting
- Offline operation
  [Flash ROM setting] screen → CH□ Non procedure system setting

[Setting screen]



[Setting items]

Setting item		Setting value storage buffer memory address	Reference section containing detailed explanation
Received data count designation		A4H/144H	Chapter 6 of User's Manual (Basic)
Receive complete code designation		A5H/145H	
Receive user frame designation	User frame use enable/disable designation	ADH/14DH	
	First frame No. designation 1st to 4th	AEH to B1H/14EH to 151H	
	Last frame No. designation 1st to 4th	B2H to B5H/152H to 155H	
User frame receive format designation 1st to 4th		2020H to 2023H/ 2120H to 2123H	Chapters 9 and 11 of User's Manual (Application)
Exclusive format-1 received data count 1st to 4th		2024H to 2027H/ 2124H to 2127H	
Transmission user frame designation	CR/LF output designation	B7H/157H	
	Output head pointer designation	B8H/158H	
	Output count designation	B9H/159H	
Timeout at No-protocol		2014H/2114H	Chapters 6 of User's Manual (Application)

8.4.8 Bidirectional system setting

[Purpose]

For data transmission using the bidirectional protocol, register system setting values.

[Startup procedure]

- Online operation
  [Monitor] screen → CH□ Bidirectional system setting
- Offline operation
  [Flash ROM setting] screen → CH□ Bidirectional system setting

[Setting screen]

[Setting item]

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
Simultaneously transmission data valid/invalid designation	9BH/13BH	Section 7.3 of User's Manual (Basic)

8.4.9 PLC CPU monitoring system setting

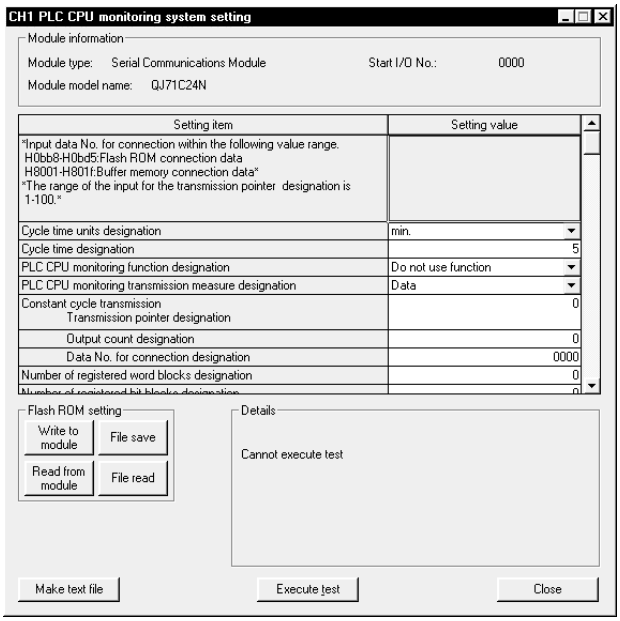
[Purpose]

Register system setting values to use the PLC CPU monitoring function.

[Startup procedure]

- Online operation
  [Monitor] screen → CH□ Monitoring system setting
- Offline operation
  [Flash ROM setting] screen → CH□ Monitoring system setting

[Setting screen]



[Setting items]

Setting item		Setting value storage buffer memory address	Reference section containing detailed explanation
Cycle time units designation		2040H/2140H	Chapter 2 of User's Manual (Application)
Cycle time designation		2041H/2141H	
PLC CPU monitoring function designation		2042H/2142H	
PLC CPU monitoring transmission measure designation		2043H/2143H	
Constant cycle transmission	Transmission pointer	2044H/2144H	
	Output count designation	2045H/2145H	
	Data No. for connection designation	2046H/2146H	
Number of registered word blocks designation		204DH/214DH	
Number of registered bit blocks designation		204EH/214EH	
PLC CPU abnormal monitoring designation		204FH/214FH	
No. n block monitoring device Monitoring device designation		2050H/2150H to 20A1H/21A1H	
Head device No. designation		2051H-2052H/2151H-2152H to 20A1H-20A2H/21A1H-21A2H	
Read point designation		2053H/2153H to 20A3H/21A3H	
Condition agreement transmission Monitoring condition designation		2054H/2154H to 20A4H/21A4H	
Monitoring condition value designation		2055H/2155H to 20A5H/21A5H	
Transmission pointer designation		2056H/2156H to 20A6H/21A6H	
Number of output designation		2057H/2157H to 20A7H/21A7H	
Data No. for connection designation		2058H/2158H to 20A8H/21A8H	
PLC PCU abnormal monitoring designation Condition agreement transmission Transmission pointer		20E6H/21E6H	
Output count designation		20E7H/21E7H	
Data No. for connection designation		20E8H/21E8H	

8.4.10 Transmission user frame No. designation system setting

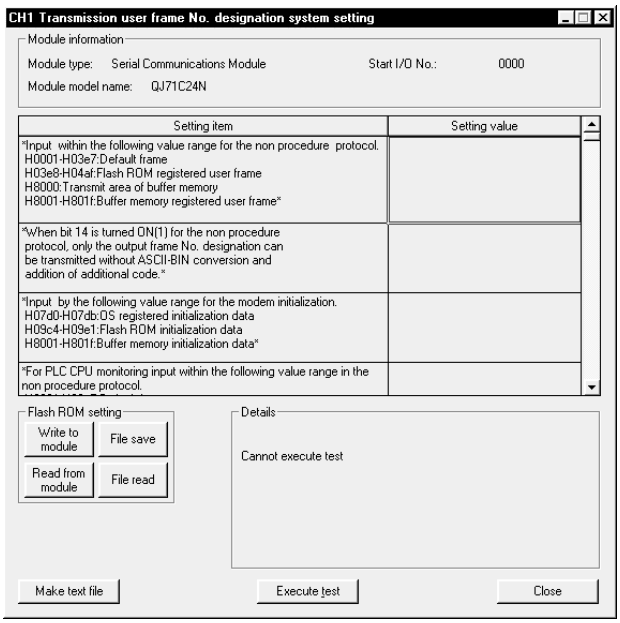
[Purpose]

Register the output frame number to transmit data with the non procedure protocol using the user frame.

[Startup procedure]

- Online operation
  [Monitor] screen → CH□ Output frame system setting
- Offline operation
  [Flash ROM setting] screen → CH□ Output frame system setting

[Setting screen]



[Setting item]

Setting item	Setting value storage buffer memory address	Reference section containing detailed explanation
Output frame No. designation 1st to 100th	BA$_H$ to 11D$_H$/ 15A$_H$ to 1BD$_H$	Chapter 11 of User's Manual (Application)

8.4.11 Resetting the buffer memory/flash ROM setting values to the default values

This section explains how to reset the values set in the buffer memory/flash ROM to their default values.

[Startup procedure]

[Online] → [Monitor/test] →"Select monitor/Test module" → Monitor/test → [Monitor] screen

[Operating procedure]

(Procedure 1) In the [Monitor] screen, select [Default request] for [System setting default].

(Procedure 2) Click on Execute test.

The setting values in the buffer memory will return to their default values.

(Procedure 3) Change the setting of [Flash ROM write allow/prohibit] to "Allowed."

(Procedure 4) In the [Monitor] screen, select [Write request] for [System setting write].

(Procedure 5) Click on Execute test.

The setting values in the flash ROM will return to their default values.

* When confirming the processing results in GX Configurator-SC, perform Read from module.

(Items subject to this operation in the [Monitor] screen)

Setting item	Current value	Setting value
System setting can be made default with the following procedure. Execute test "System setting default" Make "Flash ROM write allow/prohibit designation" "Allow" Execute test "System setting write"		
System setting default	Default request	Default request
Flash ROM write allow/prohibit designation	Allow	Allow
System setting write	Write request	Write request

8.4.12 Flash ROM write allow/prohibit setting

This section explains the settings to allow or prohibit writing to the flash ROM.

[Startup procedure]

[Online] → [Monitor/test] → "Select monitor/Test module" → Monitor/test → [Monitor] screen

[Operating procedure]

(Procedure 1) In the [Monitor] screen, select [Flash ROM write allow/prohibit] and set "Allowed" or "Prohibited."

(Procedure 2) Click on Execute test.

[Flash ROM write allow/prohibit] will be set to "Allowed" or "Prohibited," accordingly.

8.5 Auto Refresh Setting

The Auto Refresh Settings are used to automatically store the error information and status information currently stored in the Q series C24's buffer memory in the device specified by the PLC CPU.
For details, see Section 4.6.

8.6 Monitor/Test

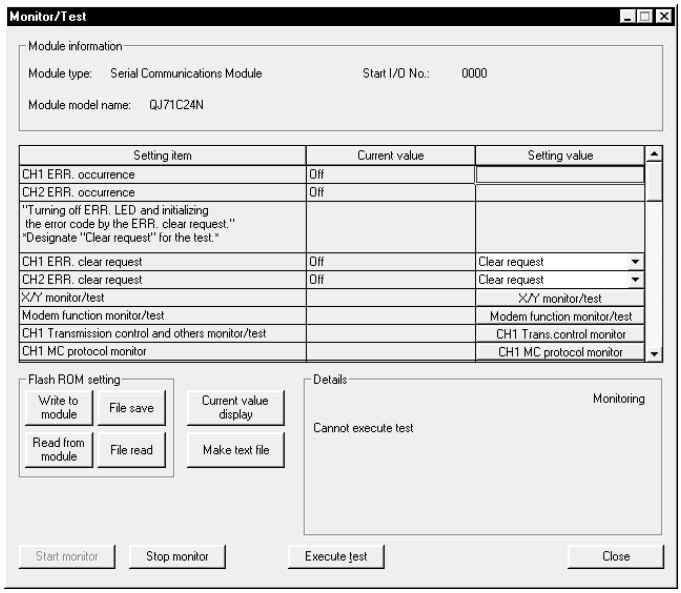
[Purpose]

The displayed menu screen is used to perform various operations, including the monitoring of the Q series C24's operating status and setting values and the testing of its output signals. The monitor/test operations can be performed only via online operation.

[Startup procedure]

* Startup from Intelligent function module utility
  (GX Developer Version 4 or later)
  [Online] → [Monitor/test] → "Select monitor/Test module" → Monitor/test → [Monitor] screen
* Startup from the system monitor (GX Developer Version 6 or later).
  [GX Developer] → [Diagnostics] → [System Monitor] → "Select the Q series C24 by installation status" → Diagnostics... → [Monitor] screen

[Monitor/test screen]



[Monitor/test items]

The following selection menus for monitor/test operation will be displayed.

Function	Reference section containing explanation
ERR. occurrence	Section 8.6.10
ERR. clear request (Communication error information, error code information)	
X · Y monitor/test	Section 8.6.1
Modem function monitor/test	Section 8.6.2
Transmission control and others monitor/test	Section 8.6.3
MC protocol monitor	Section 8.6.4
Non procedure monitor/test	Section 8.6.5
Bidirectional monitor	Section 8.6.6
PLC CPU monitoring monitor	Section 8.6.7
Transmission user frame No. designation monitor	Section 8.6.8
Monitor/test others	Section 8.6.9
System setting default, system setting write	Section 8.4.11
Flash ROM write allow/prohibit designation	Section 8.4.12

8.6.1 X · Y monitor/test

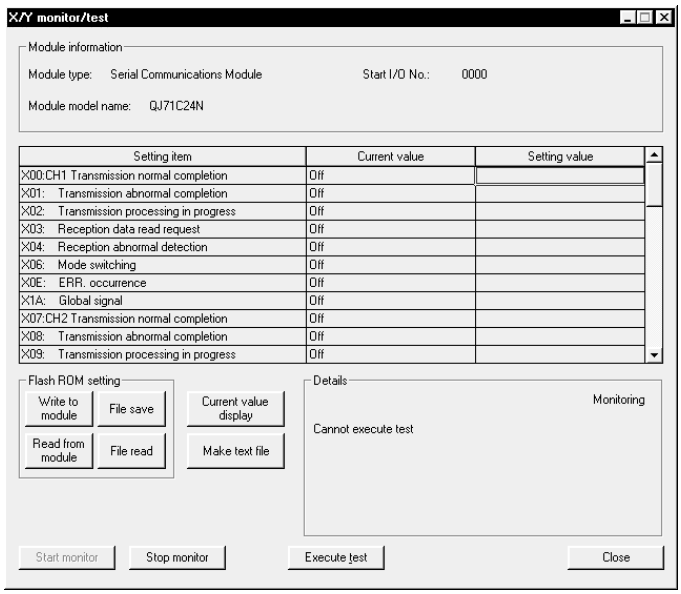
[Purpose]

Perform the monitoring of I/O signals and testing of output signals.

[Startup procedure]

[Monitor] screen → X · Y monitor/test

[Monitor/test screen]



[Monitor/test items]

Monitor/test items	Setting value storage buffer memory address	Reference section containing detailed explanation
X00: CH1 Transmission normal completion	—	Section 3.8.
X01: CH1 Transmission abnormal completion	—	
X02: CH1 Transmission processing in progress	—	
X03: CH1 Reception data read request	—	
X04: CH1 Reception abnormal detection	—	
X06: CH1 Mode switching	—	
X0E: CH1 ERR. Occurrence	—	
X1A: CH1 Global signal	—	
X07: CH2 Transmission normal completion	—	
X08: CH2 Transmission abnormal completion	—	
to	to	
Y18: Flash ROM write request	—	
Y19: Flash ROM system setting request	—	
Y1C: System setting default request	—	

8.6.2 Modem function monitor/test

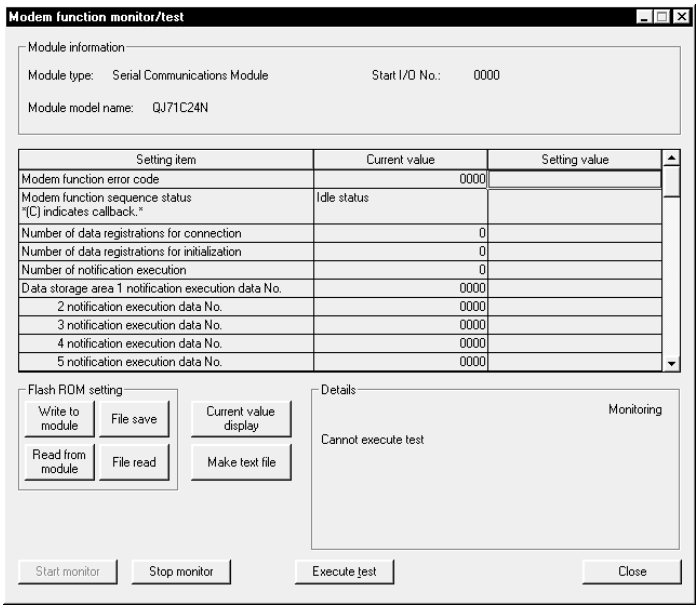
[Purpose for monitor/test]

Monitor/test the operating status and setting values of the modem function.

[Startup procedure]

[Monitor] screen → Modem function monitor/test

[Monitor/test screen]



[Monitor/test items]

Monitor/test items	Setting value storage buffer memory address	Reference section containing detailed explanation
Modem function error code	221H	Section 3.3 of User's Manual (Application)
Modem function sequence status	222H	
Number of data registration for connection	223H	
Number of data registrations for initialization	226H	
Number of notification execution	229H	
Data storage area 1 notification execution data No.	22AH	
Data storage area 2 notification execution data No.	22EH	
Data storage area 3 notification execution data No.	232H	
Data storage area 4 notification execution data No.	236H	
Data storage area 5 notification execution data No.	23AH	
X10: Modem initialization completion	—	
X11: Dial in progress	—	
X12: Connection in progress	—	
X13: Initialization/connection abnormal completion	—	
X14: Modem disconnection completion	—	
X15: Notification normal completion	—	
X16: Notification abnormal completion	—	
Y10: Modem initialization request	—	

Monitor/test items	Setting value storage buffer memory address	Reference section containing detailed explanation
Y11: Connection request	—	Section 3.3 of User's Manual (Application)
Y12: Modem disconnection request	—	
Y14: Notification-issued request	—	
Modem connection channel designation	2EH	
Notification execution designation	2FH	
Number of connection retires designation	30H	
Connection retry interval designation ✻ units: s ✻	31H	
Initialization/connection timeout designation ✻ units: s ✻	32H	
Number of initialization retries designation	33H	
Data No. for initialization designation	34H	
Data No. for connection designation	35H	
GX Developer connection designation	36H	
No-communication interval time designation ✻ units: min ✻	37H	
RS · CS control yes/no designation	38H	
Modem initialization time DR signal valid/invalid designation	2008H	
Wait time of notification ✻ units: s ✻	200AH	
Circuit disconnect wait time (PLC CPU watch use) ✻units: s✻	200EH	
Remote password mismatch notification count designation	200CH	
Remote password mismatch notification accumulated count designation	200DH	
Accumulated count of unlock process normal completion	22FBH	
Accumulated count of unlock process abnormal completion	22FCH	
Accumulated count of lock process based on circuit disconnection	22FFH	
Auto modem initialization designation	2007H	
Callback function designation	2001H	
Callback denial notification accumulated count designation	2002H	
Data No. for Callback designation 1 to 10	2101H to 210AH	
Callback permit accumulated count	22F0H	
Callback denial accumulated count	22F1H	
Auto (callback) connection permit accumulated count	22F2H	
Auto (callback) connection denial accumulated count	22F3H	
Accumulated count of callback receive procedure cancel	22F4H	

[Test Items]

The following accumulated count of times counter values can be cleared to "0" by the select test function.

Test items	Setting value storage buffer memory address	Reference section containing detailed explanation
Accumulated count of unlock process normal completion	22FBH	Section 3.3 of User's Manual (Application)
Accumulated count of unlock process abnormal completion	22FCH	
Accumulated count of lock process based on circuit disconnection	22FFH	
Callback permit accumulated count	22F0H	
Callback denial accumulated count	22F1H	
Auto (callback) connection permit accumulated count	22F2H	
Auto (callback) connection denial accumulated count	22F3H	
Accumulated count of callback receive procedure cancel	22F4H	

[Operation procedure]

(Step 1) Display the "Modem function monitor/test" screen.

(Step 2) Click the setting value area of the item to be cleared to "0."

(Step 3) Click the "Execute test."

The counter value of the selected item becomes "0."

8.6.3 Transmission control and others monitor/test

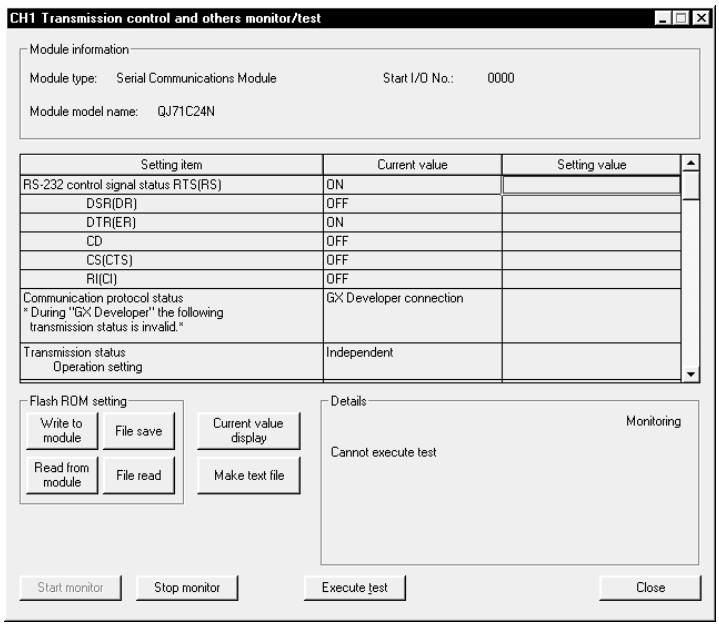
[Purpose]

Monitor the RS-232 signal status and the various setting values for data communication.

[Startup procedure]

[Monitor] screen → CH□ Transmission control monitor/test

[Monitor/test screen]



[Monitor/test items]

Monitor/test items		Setting value storage buffer memory address	Reference section containing detailed explanation
RS-232 control signal status	RTS (RS)	254H/264H ··· b0	Section 4.4.1 of User's Manual (Basic)
	DSR (DR)	254H/264H ··· b1	
	DTR (ER)	254H/264H ··· b2	
	CD	254H/264H ··· b3	
	CS (CTS)	254H/264H ··· b4	
	RI (CI)	254H/264H ··· b5	
Communication protocol status		252H/262H	Section 4.5.2 of User's Manual (Basic)
Transmission status	Operation setting	253H/263H ··· b0	
	Data bit	253H/263H ··· b1	
	Parity bit enable/disable	253H/263H ··· b2	
	Even/odd parity	253H/263H ··· b3	
	Stop bit	253H/263H ··· b4	
	Sum check code	253H/263H ··· b6	
	Write during RUM	253H/263H ··· b6	
	Setting modification	253H/263H ··· b7	

Monitor/test items		Setting value storage buffer memory address	Reference section containing detailed explanation
Transmission status	Transmission speed	253H/263H ··· b8 to b11	Section 4.5.2 of User's Manual (Basic)
DTR/DSR (ER/DR), DC control designation		93H/133H	Chapter 7 of User's Manual (Application)
DC1/DC3 (Xon/Xoff) code designation		94H/134H	
DC2/DC4 code designation		95H/135H	
Communication system designation		98H/138H	Section 4.5.2 of User's Manual (Basic)
CD terminal check designation		97H/137H	
Half-duplex communications control designation Simultaneous transmission priority/non-priority designation		99H/139H	Chapter 8 of User's Manual (Application)
Half-duplex communications control designation Retransmission time transmission method designation		9AH/13AH	
No-reception monitoring time (timer 0) designation ✻ units: byte ✻		9CH/13CH	Chapter 6 of User's Manual (Application)
Response monitoring time (timer 1) designation ✻ units: 100 ms ✻		9DH/13DH	
Transmission monitoring time (timer 2) designation ✻ units: 100 ms ✻		9EH/13EH	
Word/byte units designation		96H/136H	Chapter 5 of User's Manual (Application)
RTS (RS) designation		92H/132H ··· b0	Section 3.2.1 of User's Manual (Basic)
DTR (ER) designation		92H/132H ··· b2	
Transmission control start free area		2012H/2112H	Chapter 7 of User's Manual (Application)
Transmission control end free area		2013H/2113H	
Send/Recv data monitoring designation		2018H/2118H	Chapter 16 of User's Manual (Application)
Action for buffer full		2019H/2119H ··· b0	
Stop by Timer 0 error		2019H/2119H ··· b2	
Monitor buffer head address		201AH/211AH	
Monitor buffer size		201BH/211BH	
Transmission buffer memory head address designation		A2H/142H	Chapters 6 and 7 of User's Manual (Basic)
Transmission buffer memory length designation		A3H/143H	
Receive buffer memory head address designation		A6H/146H	
Receive buffer memory length designation		A7H/147H	
Transmission transparent code designation 1st		11FH/1BFH	Chapter 12 of User's Manual (Application)
Transmission transparent code designation 2nd to 10th		2030H to 2038H/ 2130H to 2138H	
Receive transparent code designation		120H/1C0H	
ASCII-BIN conversion designation		121H/1C1H	Chapter 13 of User's Manual (Application)
Receive interrupt-issued designation		2010H/2110H	Chapter 4 of User's Manual (Application)

8.6.4 MC protocol monitor

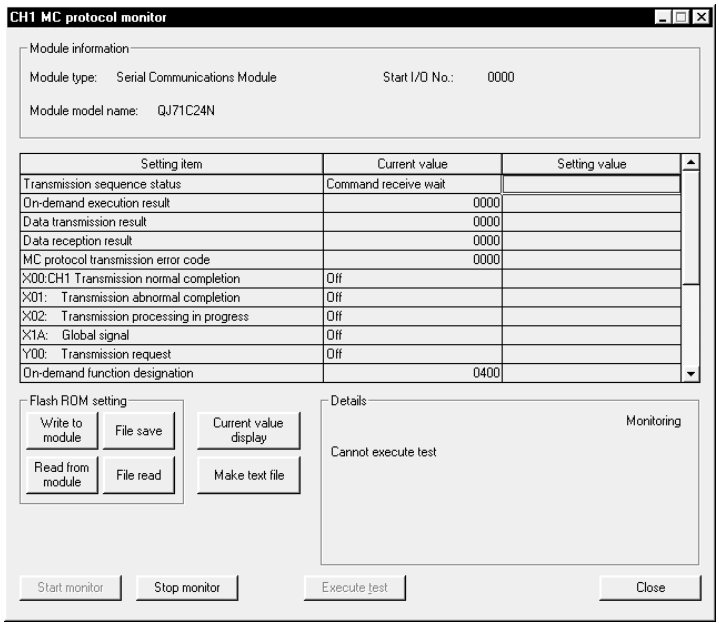
[Purpose]

Monitor the status and setting values of the data communication using the MC protocol.

[Startup procedure]

[Monitor] screen → CH□ MC protocol monitor

[Monitor screen]



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[Monitor items]

Monitor items		Setting value storage buffer memory address	Reference section containing detailed explanation
Transmission sequence status		255H/265H	Chapter 10 of User's Manual (Basic) Sections 3.10 and 3.11 of Reference Manual
On-demand execution result		256H/266H	
Data transmission result		257H/267H	
Data reception result		258H/268H	
MC protocol transmission error code		25AH/26AH	
X00: CH1 Transmission normal completion		—	
X01: CH1 Transmission abnormal completion		—	
X02: CH1 Transmission processing in progress		—	
X1A: CH1 Global signal		—	
Y00: CH1 Transmission request		—	
On-demand function designation	Buffer memory head address designation	A0H/140H	
	Data length designation	A1H/141H	
On-demand user frame designation	First frame No. designation 1st	A9H/149H	Chapter 10 of User's Manual (Application)
	First frame No. designation 2nd	AAH/14AH	
	Last frame No. designation 1st	ABH/14BH	
	Last frame No. designation 2nd	ACH/14CH	
Message wait time designation ∗units: 10 ms∗		11EH/1BEH	Chapter 6 of User's Manual (Application)

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8.6.5 Non procedure monitor/test

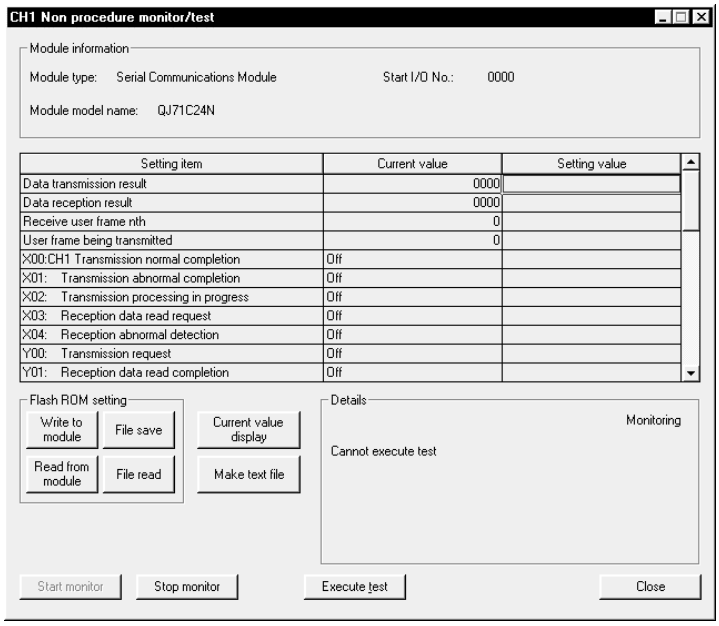
[Purpose]

Monitor the status and setting values of the data transmission using the non procedure protocol. The test operation for the receive data clear is explained in Section 8.7.

[Startup procedure]

[Monitor] screen → CH□ Non procedure monitor/test

[Monitor/test screen]



[Monitor/test items]

Monitor/test items		Setting value storage buffer memory address	Reference section containing detailed explanation
Data transmission result		257H/267H	Chapter 10 of User's Manual (Basic)
Data reception result		258H/268H	
Receive user frame nth		25BH/26BH	Chapter 11 of User's Manual (Application)
User frame being transmitted		B6H/156H	
X00: CH1 Transmission normal completion		—	Chapter 6 of User's Manual (Basic)
X01: CH1 Transmission abnormal completion		—	
X02: CH1 Transmission processing in progress		—	
X03: CH1 Reception data read request		—	
X04: CH1 Reception abnormal detection		—	
Y00: CH1 Transmission request		—	
Y01: CH1 Reception data read completion		—	
Received data count designation		A4H/144H	Chapter 6 of User's Manual (Basic)
Receive complete code designation		A5H/145H	
Receive user frame designation	User frame use enable/disable designation	ADH/14DH	Chapter 9 of User's Manual (Application)
	First frame No. designation 1st to 4th	AEH to B1H/14EH to 151H	
	Last frame No. designation 1st to 4th	B2H to B5H/152H to 155H	
User frame receive format designation 1st to 4th		2020H to 2023H/ 2120H to 2123H	
Exclusive format-1 received data count 1st to 4th		2024H to 2027H/ 2124H to 2127H	
Transmission user frame designation	CR/LF output designation	B7H/157H	
	Output head pointer designation	B8H/158H	
	Output count designation	B9H/159H	
Timeout at No-protocol		2014H/2114H	Chapter 6 of User's Manual (Application)
Receive data clear request		A8H/148H	Chapter 6 of User's Manual (Basic)

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8.6.6 Bidirectional monitor

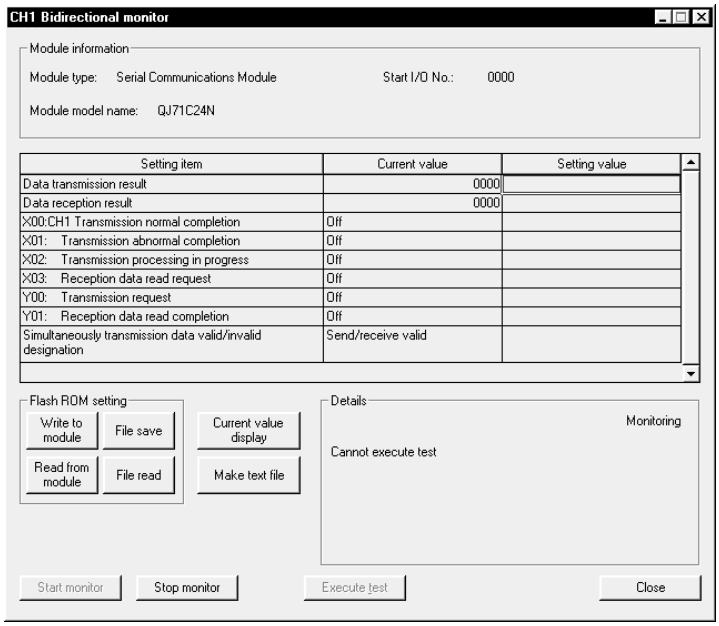
[Purpose]

Monitor the status and setting values of the data transmission using the bidirectional protocol.

[Startup procedure]

[Monitor] screen → CH□ Bidirectional monitor

[Monitor screen]



[Monitor items]

Monitor items	Setting value storage buffer memory address	Reference section containing detailed explanation
Data transmission result	257H/267H	Chapter 10 of User's Manual (Basic)
Data reception result	258H/268H	
X00: CH1 Transmission normal completion	—	Chapter 7 of User's Manual (Basic)
X01: CH1 Transmission abnormal completion	—	
X02: CH1 Transmission processing in progress	—	
X03: CH1 Reception data read request	—	
Y00: CH1 Transmission request	—	
Y01: CH1 Reception data read completion	—	
Simultaneously transmission data valid/invalid designation	9BH/13BH	Section 7.3 of User's Manual (Basic)

8.6.7 PLC CPU monitoring monitor

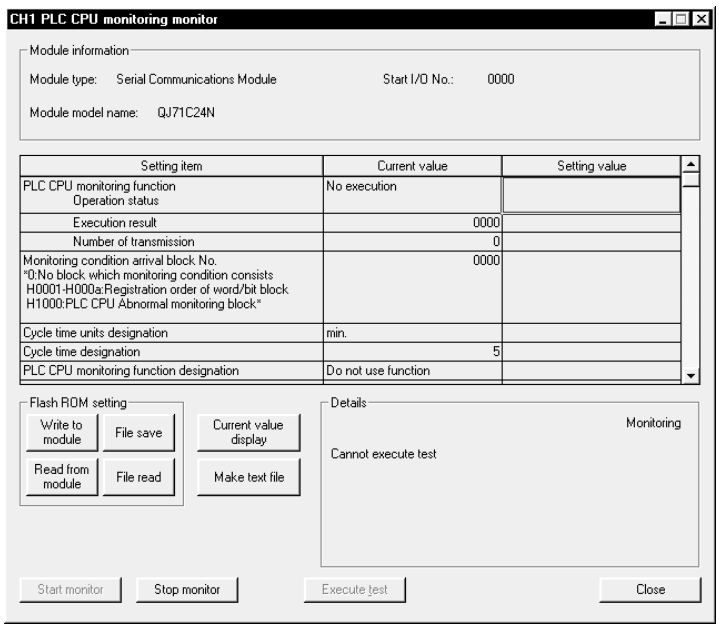
[Purpose]

Monitor the operating status and setting values of the PLC CPU monitoring function.

[Startup procedure]

[Monitor] screen → CH□ Monitoring monitor

[Monitor screen]



[Monitor items]

Monitor items		Setting value storage buffer memory address	Reference section containing detailed explanation
PLC CPU monitoring function	Operation status	2204H/2304H	Chapter 2 of User's Manual (Application)
	Execution result	2205H/2305H	
	Number of transmission	2206H/2306H	
Monitoring condition arrival block No.		2207H/2307H	
Cycle time units designation		2040H/2140H	
Cycle time designation		2041H/2141H	
PLC CPU monitoring function designation		2042H/2142H	
PLC CPU monitoring transmission measure designation		2043H/2143H	
Constant cycle transmission	Transmission pointer	2044H/2144H	
	Output count designation	2045H/2145H	
	Data No. for connection designation	2046H/2146H	
Number of registered word blocks designation		204DH/214DH	
Number of registered bit blocks designation		204EH/214EH	
PLC CPU abnormal monitoring designation		204FH/214FH	
No. n block monitoring device Monitoring device designation		2050H/2150H to 20A1H/21A1H	
Head device No. designation		2051H-2052H/2151H-2152H to 20A1H-20A2H/21A1H-21A2H	
Read point designation		2053H/2153H to 20A3H/21A3H	
Condition agreement transmission Monitoring condition designation		2054H/2154H to 20A4H/21A4H	
Monitoring condition value designation		2055H/2155H to 20A5H/21A5H	
Transmission pointer designation		2056H/2156H to 20A6H/21A6H	
Output count designation		2057H/2157H to 20A7H/21A7H	
Data No. for connection designation		2058H/2158H to 20A8H/21A8H	
PLC PCU abnormal monitoring designation Condition agreement transmission Transmission pointer		20E6H/21E6H	
Number of output designation		20E7H/21E7H	
Data No. for connection designation		20E8H/21E8H	

8.6.8 Transmission user frame No. designation monitor

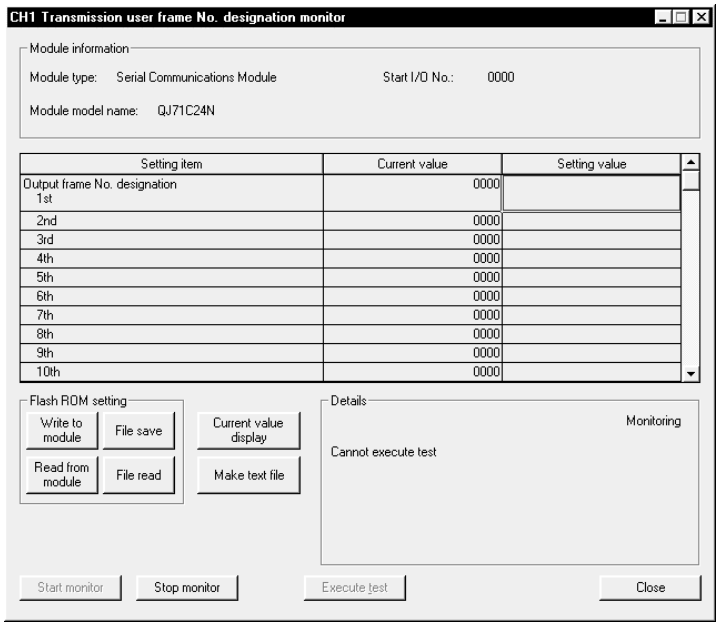
[Purpose]

Monitor the setting value of output frame number used when transmitting data with the non procedure protocol using the user frame.

[Startup procedure]

[Monitor] screen → CH□ Output frame monitor

[Monitor screen]



[Monitor item]

Monitor item	Setting value storage buffer memory address	Reference section containing detailed explanation
Output frame No. designation 1st to 100th	BA$_H$ to 11D$_H$/ 15A$_H$ to 1BD$_H$	Chapters 9 through 11 of User's Manual (Application)

8.6.9 Monitor/test others

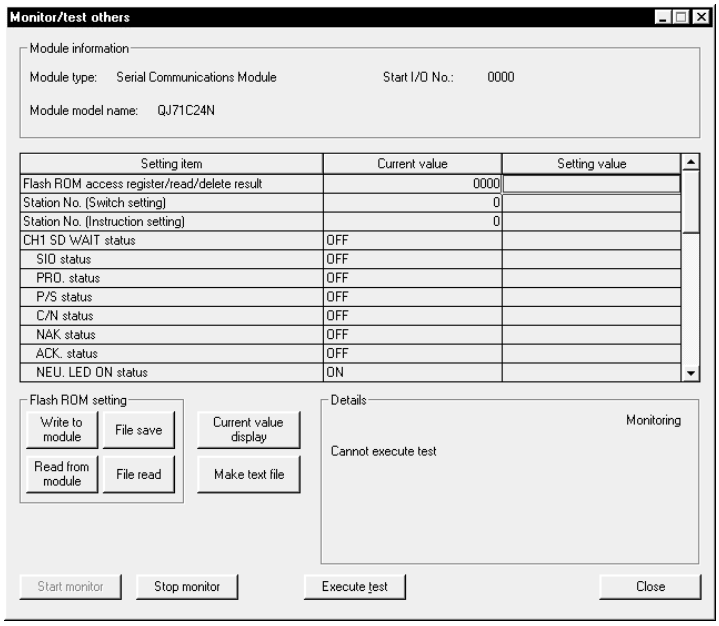
[Purpose]

Monitor the result of access to the flash ROM, the data communication status of each interface, and the result of the intelligent function module switch settings using GX Developer.

[Startup procedure]

[Monitor] screen → Monitor/test others

[Monitor/test screen]



[Monitor/test items]

Monitor/test items		Setting value storage buffer memory address	Reference section containing detailed explanation
Flash ROM access register/read/delete result		4H	Chapter 10 of User's Manual (Basic)
Station No. (Switch setting)		200H	
Station No. (Instruction setting)		24FH	
CH1	SD WAIT status	201H ··· b0	
	SIO status	201H ··· b1	
	PRO. status	201H ··· b2	
	P/S status	201H ··· b3	
	C/N status	201H ··· b4	
	NAK status	201H ··· b5	
	ACK. status	201H ··· b6	
	NEU. LED status	201H ··· b7	
	ERR. LED status	202H ··· b15	
Communication error clear request for CH1 and to turn LED off		0H	
CH2	SD WAIT status	202H ··· b0	
	SIO status	202H ··· b1	
	PRO. status	202H ··· b2	
	P/S status	202H ··· b3	
	C/N status	202H ··· b4	
	NAK status	202H ··· b5	
	ACK. status	202H ··· b6	
	NEU. LED status	202H ··· b7	
	ERR. LED status	202H ··· b14	
Communication error clear request for CH2 and to turn LED off		1H	
CH1 Communication protocol setting No. error		203H ··· b0	
CH1 Transmission speed setting error		203H ··· b1	
CH1 Mode switching error of setting change prohibit time		203H ··· b3	
CH2 Communication protocol setting No. error		203H ··· b4	
CH2 Transmission speed setting error		203H ··· b5	
CH2 Mode switching error of setting change prohibit time		203H ··· b7	
Station No. out of range error		203H ··· b14	
Linked operation setting error		203H ··· b15	
Number of registered user frame		204H	
Number of registered default registration frames		21EH	
Flash ROM system parameters write result		220H	

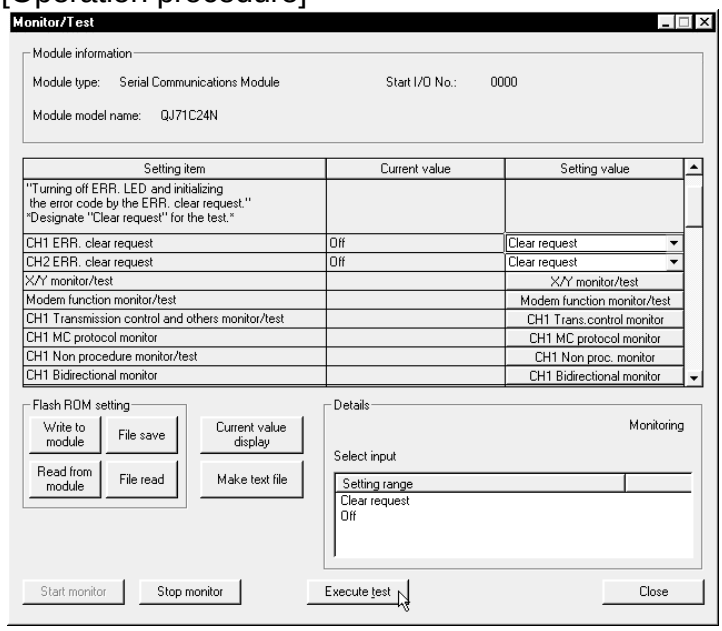
8.6.10 Display LED off and communication error information/error code initialization

This section explains how to turn off the display LEDs of the Q series C24 and initialize its communication error information and error codes.

(1) CH□ ERR. clear request on Monitor/Test screen

This is used to turn off the CH□ ERR. LED of the Q series C24 and to initialize (clear) the error codes stored in the CH□ side buffer memory.
Refer to Section 10.1.2 (1) for the buffer memory where the error codes are stored.

[Operation procedure]



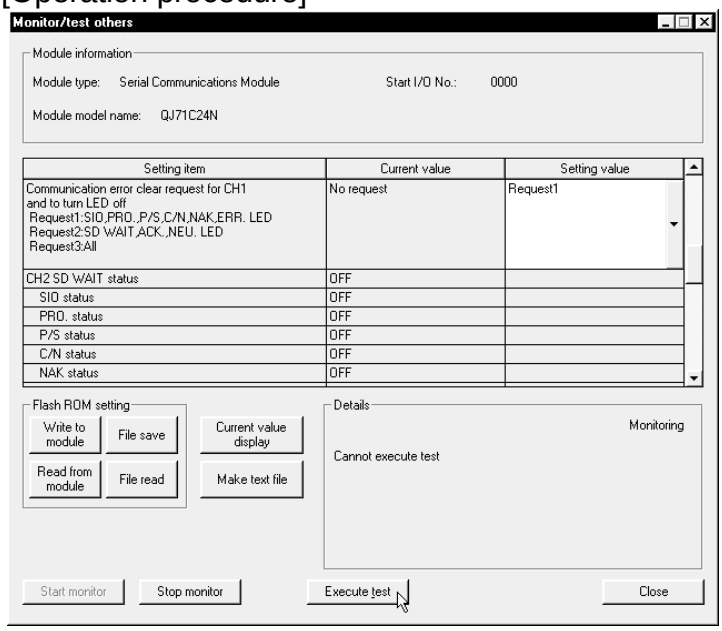
1) Display the "Monitor/Test" screen.
2) Select "Clear request" for "CH□ ERR. clear request".
3) Click on [Execute test].

(2) Communication error clear request for CH□ and to turn LED off on Monitor/test others screen

This is used to turn off the CH□ LED of the Q series C24 and to initialize (clear) the communication error information.

The CH□ LED on status and communication error information can be confirmed on the Monitor/test others screen.

[Operation procedure]



1) Display the "Monitor/test others" screen.

2) Select any of "Request 1 to 3" for "Communication error clear request for CH□ and to turn LED off".

Setting range	Target of LED off/communication error information initialization
Request 1	SIO, PRO., P/S, C/N, NAK, ERR. LED (*1)
Request 2	SD WAIT, ACK., NEU. LED
Request 3	All of Requests 1 and 2

*1 The ERR. LED is turned off. (However, it is not turned off if an error has occurred on either the CH1 or CH2 side.)

3) Click on [Execute test].

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8.7 Non Procedure Protocol Receive Data Clear

This section explains how to clear the received data using the non procedure protocol.

By using this function, the receive data can be cleared from GX Configurator-SC while the communication with the non procedure protocol is still in progress, without resetting the PLC CPU or turning off the power.

[Operation procedure]

(Procedure 1) Display the [Non procedure monitor/test] screen. (See Section 8.6.5.)
(Procedure 2) Set [Clear request issued] for "Receive data clear request".
(Procedure 3) Click on Execute test.
The received data will be cleared.

POINT
Clear the received data when transmission/reception are not in progress with the external device. Executing a receive data clear while the data transmission is in progress causes the Q series C24 to stop the data transmission abruptly, resulting in an abnormal completion of the dedicated transmission instruction. (The transmission completion signal will not be lit.) When the receive data clear is executed while the data reception is in progress, the data received up to that point will be cleared.

9 DEDICATED INSTRUCTIONS

Dedicated instructions are used to simplify programming when using intelligent function module functions.
This chapter describes the dedicated instructions for the Q series C24, which is part of the functions of the QCPU (in Q mode) explained in this manual.

9.1 Dedicated Instruction List

The following table lists the dedicated instructions explained in this chapter.

Application	Dedicated instruction	Description of function	Explanation page
On-demand function transmission	ONDEMAND	Sends data using the on-demand function of the MC protocol.	Section 9.2
Non procedure protocol communication	OUTPUT	Sends data for the specified data count.	Section 9.3
	INPUT	Reads received data.	Section 9.4
Bidirectional protocol communication	BIDOUT	Sends data for the designated data count.	Section 9.5
	BIDIN	Reads received data.	Section 9.6
Communication status confirmation	SPBUSY	Reads the status of data transmission/reception via a dedicated instruction.	Section 9.7
Receive data clear	CSET	Perform the receive data clear without stopping the transmission processing during the non procedure protocol.	Section 9.8

POINT

(1) The user should not change data values (control data, request data, etc.) designated by a dedicated instruction until the execution of the dedicated instruction is completed.

(2) Dedicated instructions for the Q series C24 are executed based on the current setting values stored in the buffer memory when the module is started.
When it is necessary to change a setting value, change the value by GX Configurator-SC before starting up the module.
Alternatively, a setting value can be changed via the sequence program using a CSET instruction before starting up the PLC CPU (See the User's Manual (Application)).

1) Area of buffer memory assigned as applicable functions for dedicated instructions.
2) Setting values for data communication
   - Word/byte units designation
   - Receive complete code
   - Received data count

   etc.

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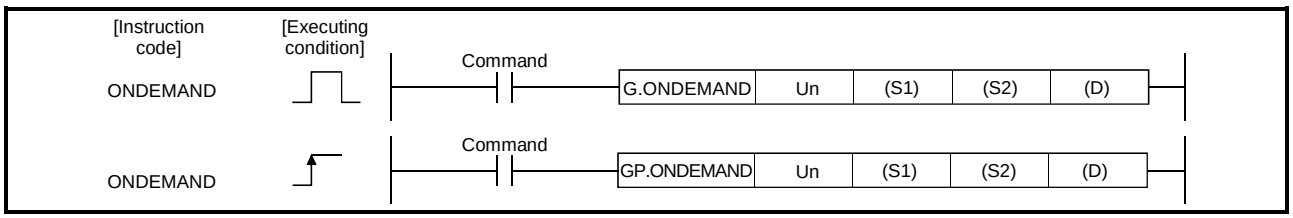
9.2 ONDEMAND Instruction

The ONDEAMAND instruction transmission data using the on-demand function of the MC protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—					
(S2)	—	○		—					
(D)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Head number of the devices in which control data is stored.	User, system	Device name
(S2)	Head number of the devices in which transmission data is stored.	User	
(D)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *3
(S1) + 0	Transmission channel	• Set transmission channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S1) + 1	Transmission result	• Result read by an ONDEMAND instruction is stored. 0: Normal Other than 0: Error code *1	—	System
(S1) + 2	Transmission data count	• Set the transmission data count. *2	1 or more	User

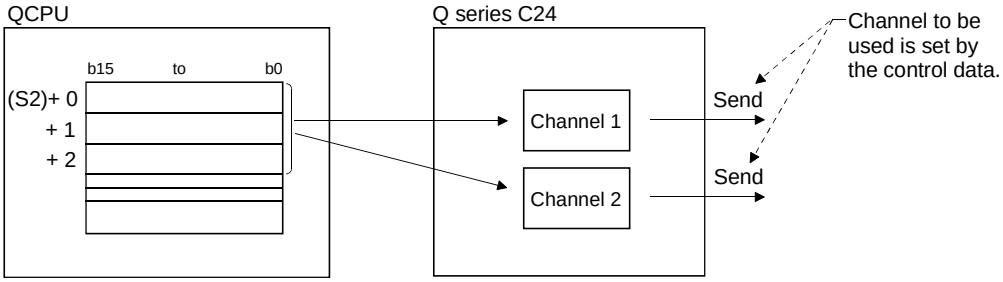
*1 For error codes relating to abnormal completion, see Chapter 10 of the User's Manual (Basic).

*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated.

*3 The settings are done by either of the following:
- User: Data set by the user before executing the ONDEMAND instructions.
- System: The PLC CPU stores the execution result of the ONDEMAND instructions.

Function

(1) Data stored in the device designated in (S2) and succeeding devices are sent according to the control data of the device designated in (S1) and succeeding devices, via the on-demand function of the MC protocol of the module designated in Un.



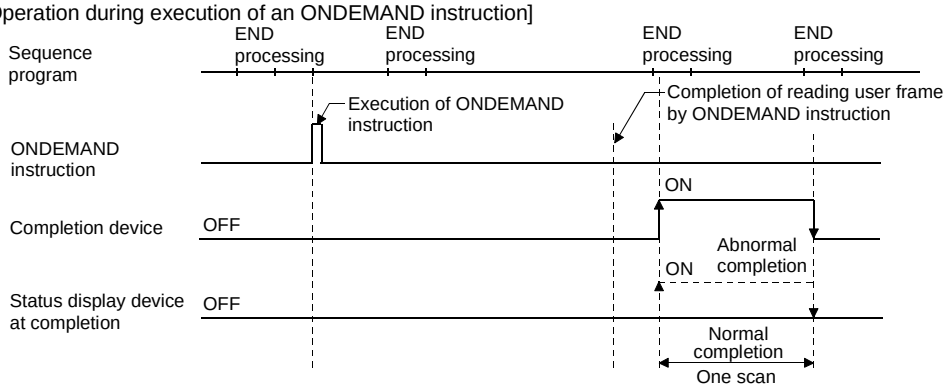
(2) When an ONDEMAND instruction is executed on a channel, other ONDEMAND instructions cannot be executed on that channel at the same time.
If an attempt is made during execution of an ONDEMAND instruction to execute another ONDEMAND instruction, the second instruction will not be executed until the execution of the first instruction is completed.

(3) Whether an ONDEMAND instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device : Turns on at the END processing of the scan where the ONDEMAND instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the ONDEMAND instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the ONDEMAND instruction is completed, and turns off at the next END processing.

[Operation during execution of an ONDEMAND instruction]

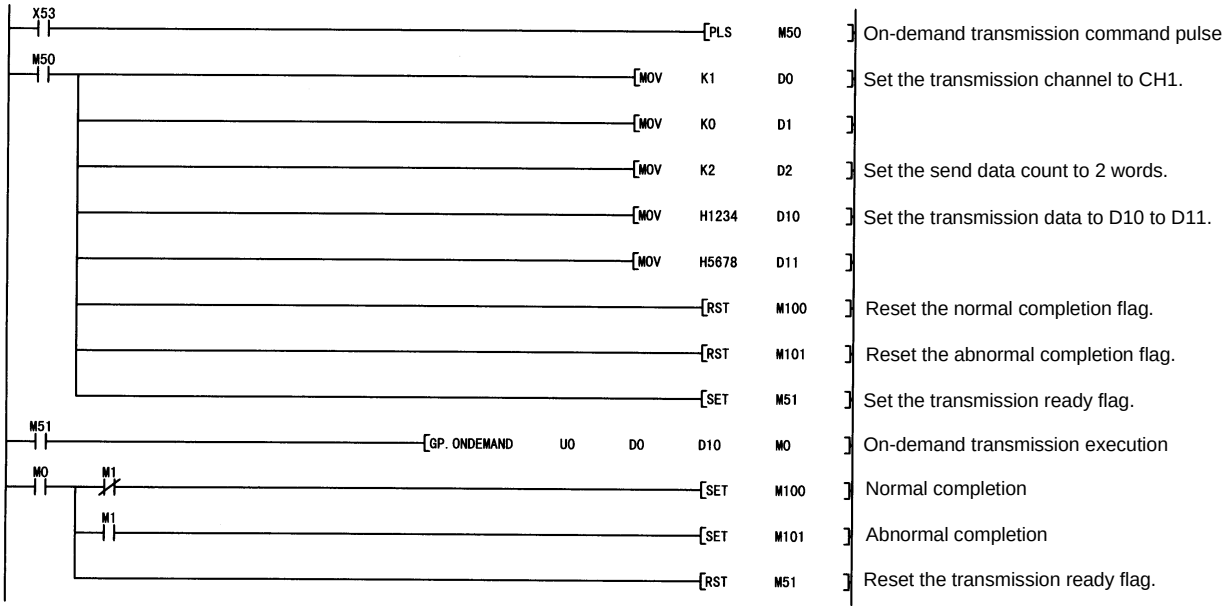


Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal, (D)+1, turns on and the error code is stored in the transmission result (S1)+1.
In case of operation errors, the error flag (SM0) turns on and the error code is stored in the SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU(Q Mode) User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 10.2 of the User's Manual (Basic)

Program example

A program that sends data stored in D10 to D11 using an on-demand transmission
When input/output signals of the Q series C24 are from X/Y00 to X/Y1F



POINT

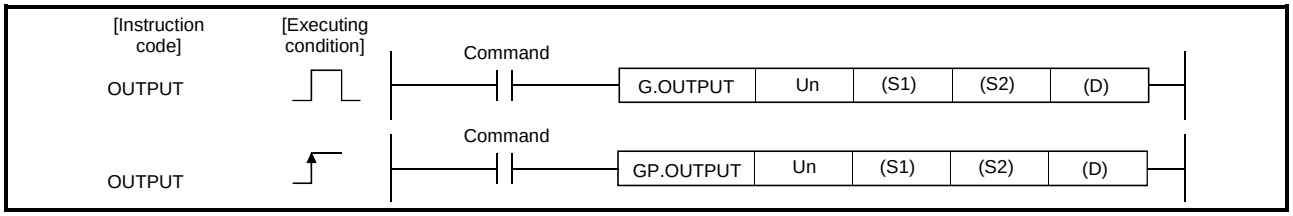
(1) The status of communication via dedicated instructions can be read by an SPBUSY instruction.

(2) Designate the storage capacity of transmission data (stored in D10 to D11 in the program example above) and data length (stored in D2 in the program example above) within the range of the buffer memory the user has assigned for an on-demand function.

9.3 OUTPUT Instruction

This instruction transmission data in any message format specified by the user using the non procedure protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—					
(S2)	—	○		—					
(D)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Head number of the devices in which control data is stored.	User, system	Device name
(S2)	Head number of the devices in which transmission data is stored.	User	
(D)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *3
(S1) + 0	Transmission channel	• Set transmission channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S1) + 1	Transmission result	• Transmission result by an OUTPUT instruction are stored. 0: Normal Other than 0: Error code *1	—	System
(S1) + 2	Transmission data count	• Set the transmission data count. *2	1 or more	User

*1 For error codes relating to abnormal completion, see Chapter 10 of the User's Manual (Basic).

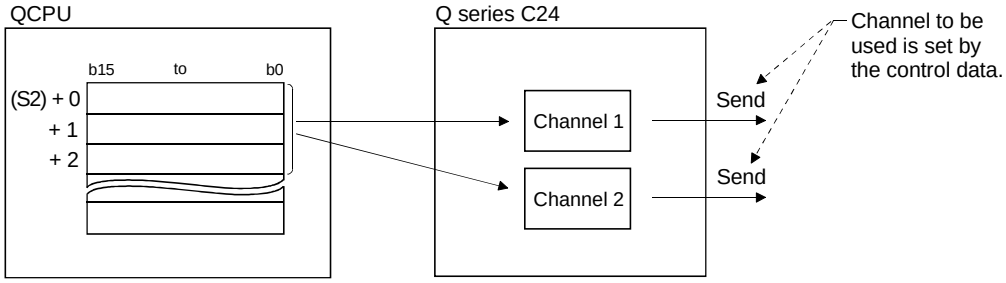
*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated and set the number of words when words are selected as the unit types.

*3 The settings are done by either of the following:

- User: Data set by the user before executing the OUTPUT instructions.
- System: The PLC CPU stores the execution result of the OUTPUT instructions.

Function

(1) Data stored in the device designated in (S2) and succeeding devices are sent according to the control data of the device designated in (S1) and succeeding devices, via the non procedure protocol of the module specified in Un.



(2) The following instructions cannot be executed on a channel on which an OUTPUT instruction is being executed.
- Other OUTPUT instructions
- PRR instructions

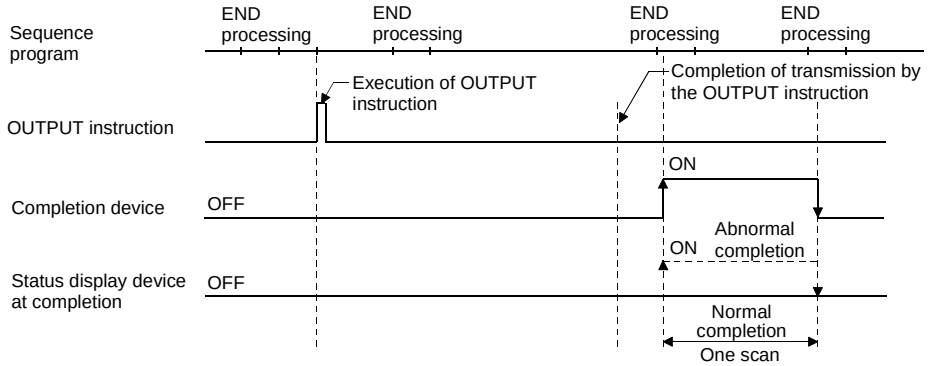
If an attempt is made during execution of an OUTPUT instruction to execute one of the instructions above, the second instruction will not be executed until the execution of the OUTPUT instruction is completed.

(3) Whether an OUTPUT instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device: Turns on at the END processing of the scan where the OUTPUT instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the OUTPUT instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the OUTPUT instruction is completed, and turns off at the next END processing.

[Operation during execution of an OUTPUT instruction]

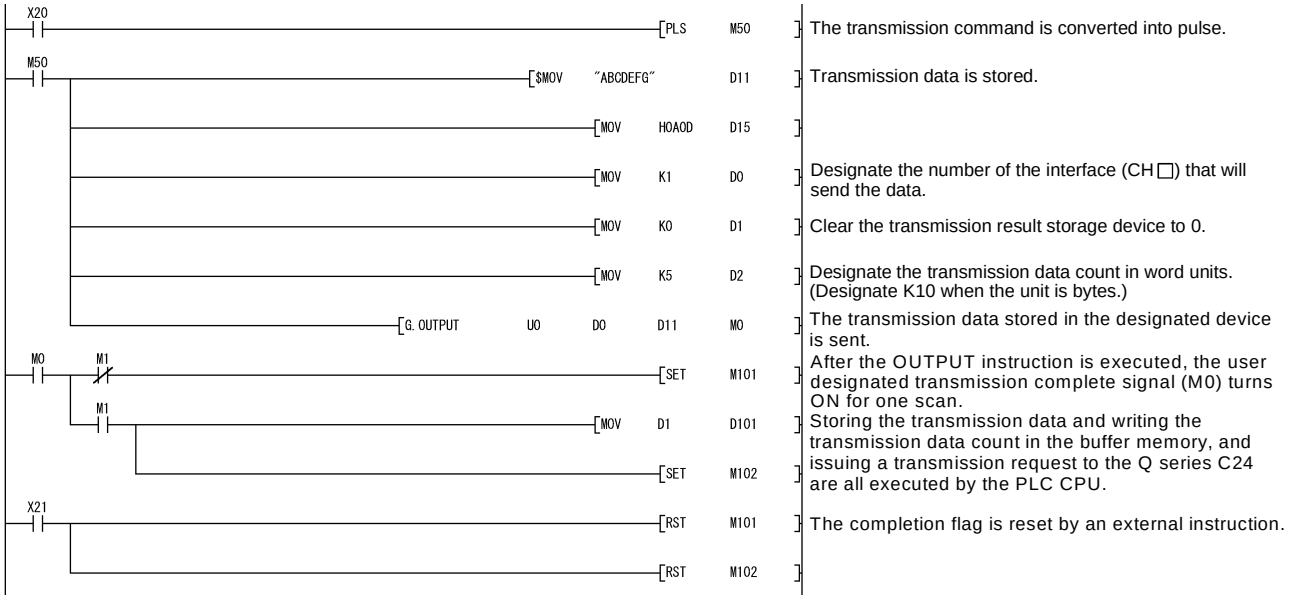


Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal, (D)+1, turns on and the error code is stored in the transmission result (S1)+1.
In case of operation errors, the error flag (SM0) turns on and the error code is stored in the SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU(Q Mode) User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 10.2 of the User's Manual (Basic)

Program example

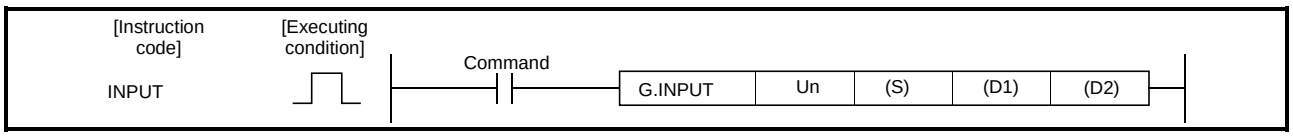
The following example shows a program that sends any data stored in D11 to D15 using the non procedure protocol.
When input/output signals of the Q series C24 are from X/Y00 to X/Y1F:



9.4 INPUT Instruction

This instruction receives data in any message format specified by the user using the non procedure protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S)	—	○		—					
(D1)	—	○		—					
(D2)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S)	Head number of the devices in which control data is stored.	User, system	Device name
(D1)	Head number of the devices in which receive data is stored.	System	
(D2)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by ＊3
(S) + 0	Receive channel	• Set receive channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S) + 1	Reception result	• Reception result by an INPUT instruction are stored. 0: Normal Other than 0: Error code ＊1	—	System
(S) + 2	Receive data count	• Receive data count is stored. ＊2	0 or more	System
(S) + 3	Allowable number of receive data	• Set the allowable number of words for received data that can be stored in (D1).	1 or more	User

POINT

(1) The command of G.INPUT cannot be converted into pulse.

(2) G.INPUT should be executed while the read request of the input/output signal is turned on.

*1 For error codes relating to abnormal completion, see Chapter 10 of the User's Manual (Basic).

*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated.

*3 The settings are done by either of the following:
- User: Data set by the user before executing the INPUT instructions.
- System: The PLC CPU stores the execution result of the INPUT instructions.

Function

(1) The function stores in the device designated in (D1) and succeeding devices the data received with the non procedure protocol of the module designated in Un, according to the control data of the device designated in (S) and succeeding devices.

(2) When an INPUT instruction is executed on a channel, other INPUT instructions cannot be executed on the channel at the same time.
If an attempt is made during execution of an INPUT instruction to execute another INPUT instruction, the second instruction will not be executed until the execution of the first INPUT instruction is completed.

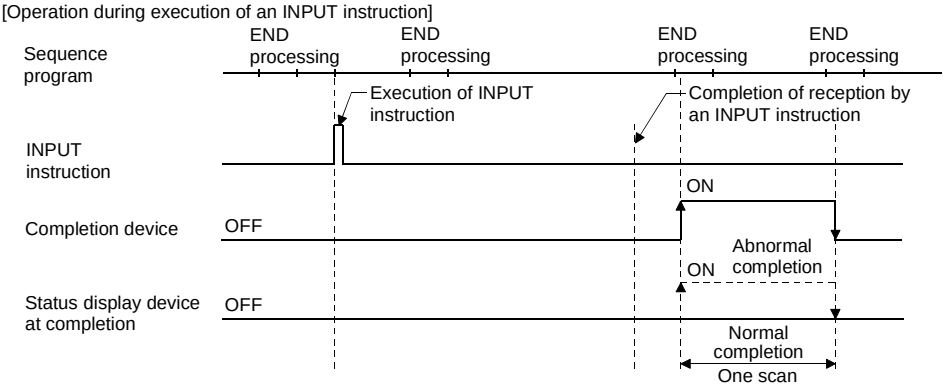
(3) In case of reading the receive data to the same interface, it cannot be used along with BUFRCVS instruction (for interrupt programs).

(4) Whether an INPUT instruction was completed normally or abnormally can be checked by the completion device ((D2)) or status display device at completion ((D2)+1).

(a) Completion device: Turns on at the END processing of the scan where the INPUT instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the INPUT instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the INPUT instruction is completed, and turns off at the next END processing.

[Operation during execution of an INPUT instruction]

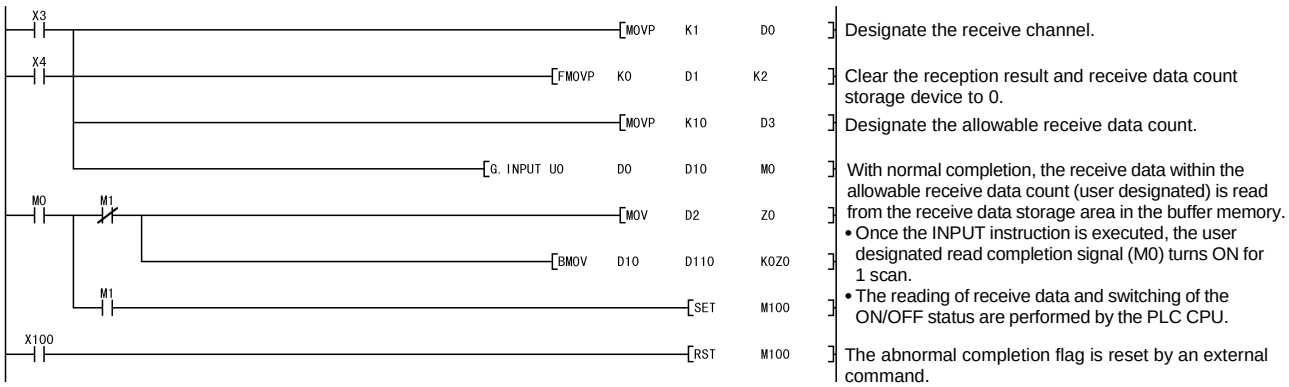


Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal (D2)+1, turns on and the error code is stored in the transmission result (S1)+1.
In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU(Q Mode) User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 10.2 of the User's Manual (Basic)

Program example

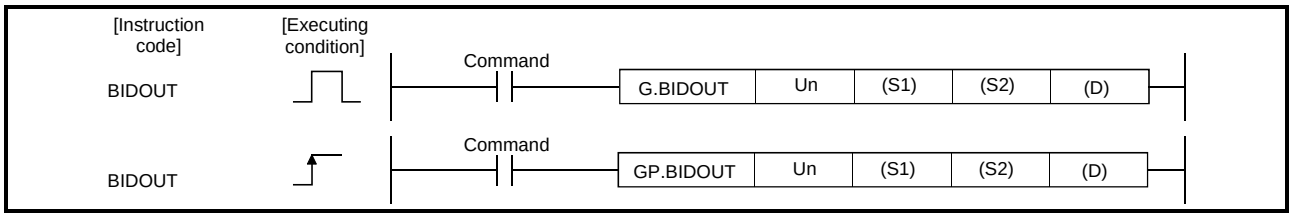
The following example shows a program that stores data received via the non-procedure protocol in D10 and later.
When the input/output signals of the Q series C24 are from X/Y00 to X/Y1F:



9.5 BIDOUT Instruction

This instruction transmission data using the bidirectional protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—					
(S2)	—	○		—					
(D)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Head number of the devices in which control data is stored.	User, system	Device name
(S2)	Head number of the devices in which transmission data is stored.	User	
(D)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *3
(S1) + 0	Transmission channel	• Set transmission channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S1) + 1	Transmission result	• Transmission result by a BIDOUT instruction are stored. 0: Normal Other than 0: Error code *1	—	System
(S1) + 2	Transmission data count	• Set the transmission data count. *2	1 or more	User

*1 For error codes relating to abnormal completion, see Chapter 10 of the User's Manual (Basic).

*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated.

*3 The settings are done by either of the following:
- User: Data set by the user before executing the BIDOUT instructions.
- System: The PLC CPU stores the execution result of the BIDOUT instructions.

Function

(1) The function sends data stored in the device designated in (S2) and succeeding devices according to the control data of the device designated in (S1) and succeeding devices, via the bidirectional protocol of the module designated in Un.

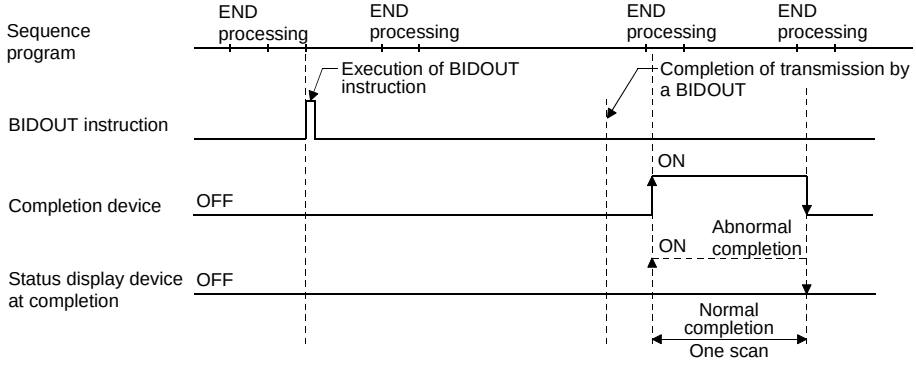
(2) When a BIDOUT instruction is executed on a channel, other BIDOUT instructions cannot be executed on that channel at the same time.
If an attempt is made during execution of a BIDOUT instruction to execute another BIDOUT instruction, the second instruction will not be executed until the execution of the first instruction is completed.

(3) Whether a BIDOUT instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device: Turns on at the END processing of the scan where the BIDOUT instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the BIDOUT instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the BIDOUT instruction is completed, and turns off at the next END processing.

[Operation during execution of a BIDOUT instruction]



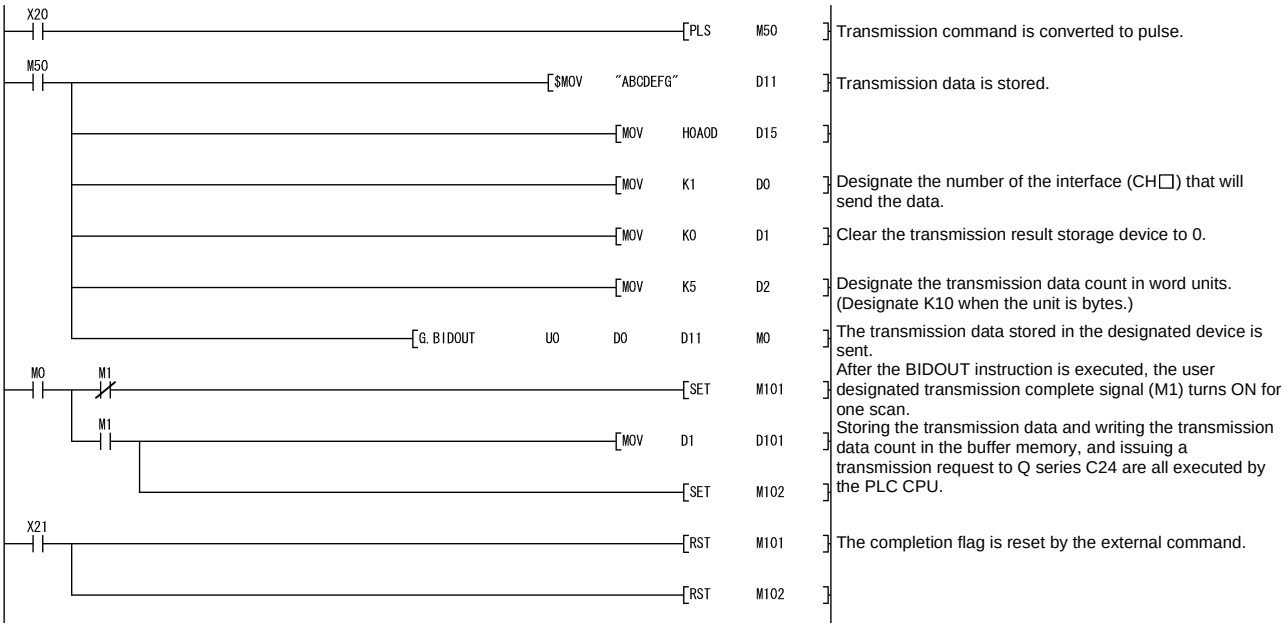
Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal (D)+1, turns on and the error code is stored in the transmission result (S1)+1.
In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU(Q Mode) User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 10.2 of the User's Manual (Basic)

Program example

The following example shows a program that sends any data stored in D11 to D15 using the bidirectional protocol.

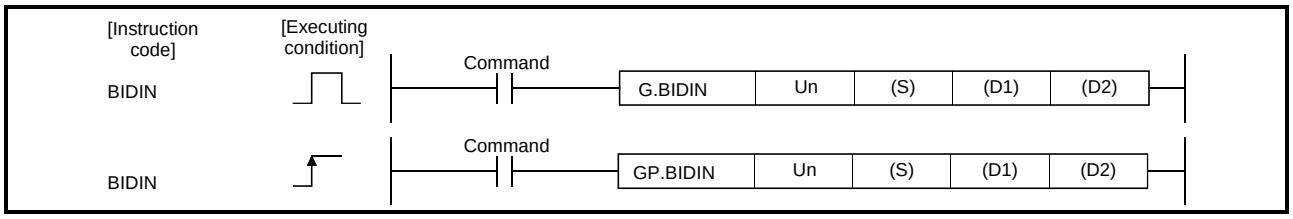
When the input/output signals of the Q series C24 are from X/Y00 to X/Y1F:



9.6 BIDIN Instruction

This instruction receives data using the bidirectional protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S)	—	○		—					
(D1)	—	○		—					
(D2)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S)	Head number of the devices in which control data is stored.	User, system	Device name
(D1)	Head number of the devices in which receive data is stored.	System	
(D2)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *2
(S) + 0	Receive channel	• Set receive channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S) + 1	Reception result	• Reception result by a BIDIN instruction are stored. 0: Normal	—	System
(S) + 2	Receive data count	• The number of data received is stored. *1	1 or more	System
(S) + 3	Allowable number of receive data	• Set the allowable number of words for received data that can be stored in (D1).	1 or more	User

POINT

(1) The command of G (P).BIDIN cannot be converted into pulse.

(2) G (P).BIDIN should be executed while the read request of the input/output signal is turned on.

∗1 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated as the unit types.

∗2 The settings are done by either of the following:
- User: Data set by the user before executing the BIDIN instructions.
- System: The PLC CPU stores the execution result of the BIDIN instructions.

Function

(1) The function stores in the device designated in (D1) and succeeding devices the data received via the bidirectional protocol of the module designated in Un, according to the control data of the device designated in (S) and succeeding devices.

(2) When a BIDIN instruction is executed on a channel, other BIDIN instructions cannot be executed on the channel at the same time.
If an attempt is made during execution of a BIDIN instruction to execute another BIDIN instruction, the second instruction will not be executed until the execution of the first instruction is completed.

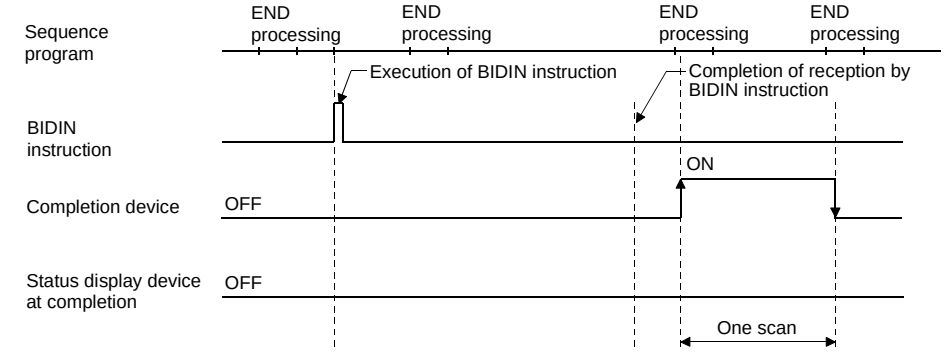
(3) It cannot be used along with BUFRCVS instruction (for interrupt programs).

(4) Whether a BIDIN instruction was completed normally can be checked by the completion device ((D2)) or status display device at completion ((D2)+1).

(a) Completion device: Turns on at the END processing of the scan where the BIDIN instruction is completed normally, and turns off at the next END processing.

(b) Status display device at completion: Does not change when left off.

[Operation during execution of a BIDIN instruction]



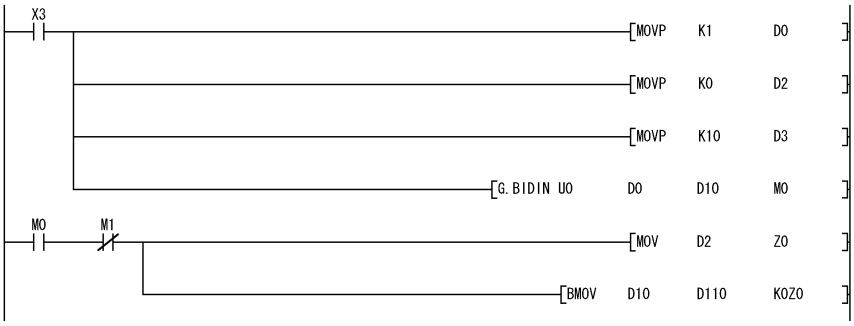
Error

(1) In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU(Q Mode) User's Manual
(Hardware Design, Maintenance and Inspection)

Program example

The following example shows a program that receives any data using the bidirectional protocol and stores that data in D10 or later.

The input/output signals of the Q series C24 are from X/Y00 to X/Y1F:



Designate the receive channel.

Clear the receive data count storage device to 0.

Designate the allowable receive data count.

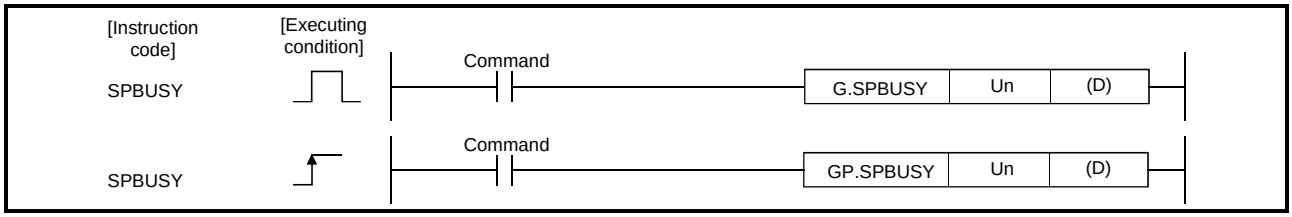
With the normal completion, the receive data within the allowable receive data count (user designated) is read from the receive data storage area in the buffer memory.

- After the BIDIN instruction is executed, the user designated read completion signal (M0) comes on for 1 scan.
- The reading of received data is performed by the PLC CPU.

9.7 SPBUSY Instruction

This instruction reads the status of data transmission and reception executed with dedicated instructions.

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(D)	○			—					



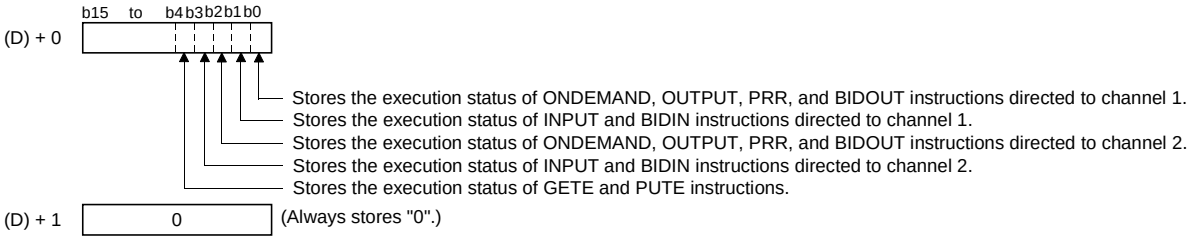
Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(D)	Head number of devices in which the read communication status is stored.	System	Device name

Function

(1) The function reads the execution status of a dedicated instruction directed to a module designated by the start I/O signal, and stores it in the device designated by (D) or later.

(2) The execution status is stored in (D) in the form of "1" at the corresponding bit when the processing of each instruction is started, and "0" when the processing is completed.
The processing of each instruction is completed when the completion flag of each instruction is turned from on to off.



(3) The SPBUSY instruction is executed for every scan while the read command is ON, if the system is executing during ON. And, the instruction will be executed for a single scan when the read command rises from OFF to ON, if the system is starting up.

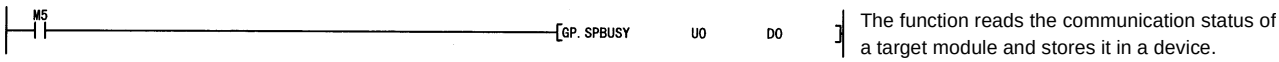
Error

(1) In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU(Q Mode) User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 10.2 of the User's Manual (Basic)

Program example

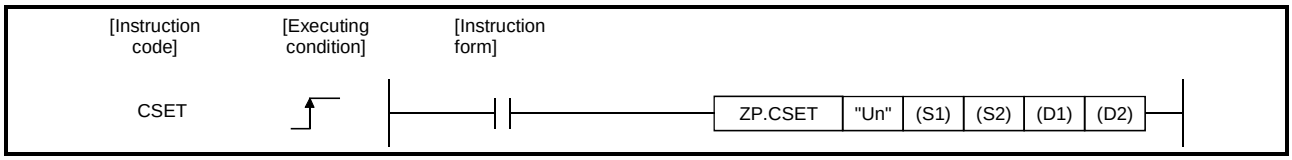
A program that reads the communication status of a target module.

When input/output signals of the Q series C24 are from X/Y00 to X/Y1F



9.8 CSET (Receive data clear)

Set data	Applicable device								
	Internal device (System, user)		File register	MELSECNET/H, MELSECNET/10 Direct J□\□		Special module U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—				K, H	—
(S2)	—	○		—					
(D1)	—	○		—					
(D2)	○	○		—					



Set data

Set data	Description	Set by	Data type
"Un"	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Number of the channel that demands to clear receiving data. 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)		
(S2)	Head number of the device that stores the control data.	User, System	Device name
(D1)	Dummy	—	Device name
(D2)	Head number of the bit device at the self-station that turns on for one scan at the completion of the instruction. (D2) + 1 also turns on at an abnormal completion.	System	Bit

Each of file registers for local device and program cannot be used as the setting data.

Control data

Device	Item	Set data	Setting range	Set by
(S2) + 0	Execution type	Select 0.	0	User
(S2) + 1	Complete status	The execution result at the completion of the instruction is stored. 0: Normal Other than 0: Abnormal (error code)	—	System
(S2) + 2	Request type	Specify the request. 4: Receive data clear request	4	User
(S2) + 3 to (S2) + 111	For system	—	—	System

REMARK

(1) See the "Error" explanation on the following page for details on errors caused by wrong data specifications by the user.

(2) The setting sides are partitioned as follows:
- User: Data set by the user before executing the dedicated instruction.
- System: The PLC CPU stores the execution result of the dedicated instruction.

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Function

(1) This function clears reception data in the OS area. It does not clear the user data reception area in the buffer memory.

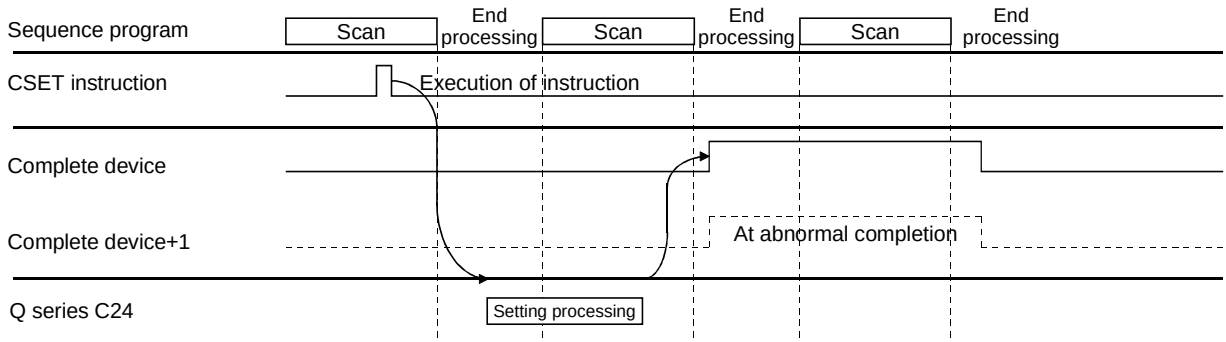
(2) If the CSET instruction is executed while the read request (X03/X0A) or reception abnormal detection signal (X04/X0B) is turned on, the CSET instruction is kept waiting until the signal is turned off.

(3) The status of the CSET instruction, whether it is being executed or completed normally/abnormally, can be checked by the complete device (D2) specified by the setting data.

(a) Complete device ((D2) + 0)
This device turns on at the End processing of the scan at which the CSET instruction is completed and turns off at the next End processing.

(b) Complete device ((D2) + 1)
It turns on/off by the status at which the CSET instruction is completed.
- At normal completion: It is kept turned off and does not change.
- At abnormal completion: It turns on at the END processing of the scan at which the CSET instruction is completed and turns off at the next END processing.

[Operation at execution of CSET instruction]



Error

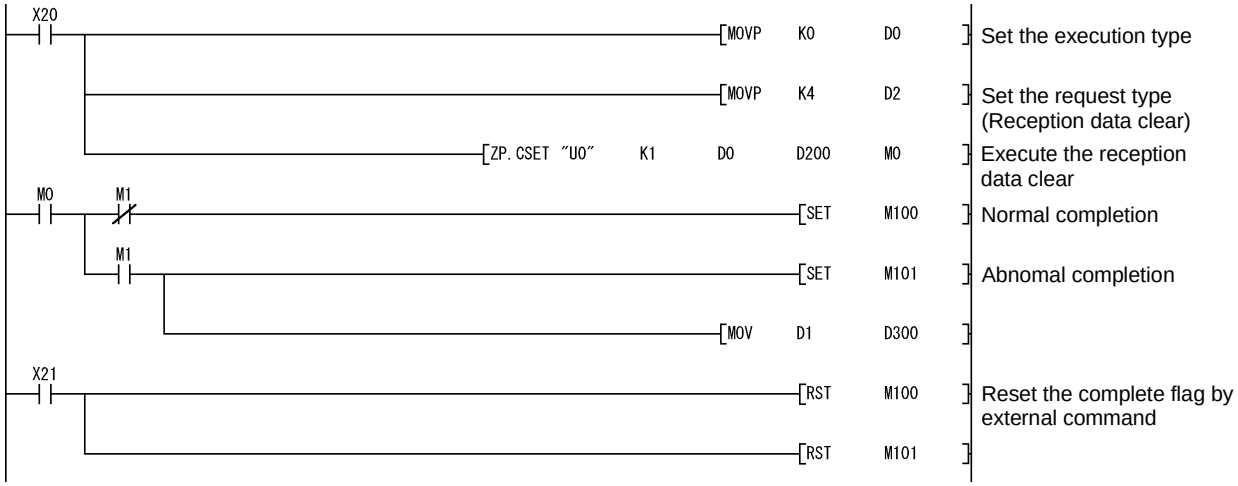
(1) If the dedicated instruction is abnormally completed, the error flag (SM0) turns on and the error code is stored in SD0.
See the following manuals according to the error code, and check/take action according to the error.

<Error code>
4FFF$_H$ or less: QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 10.2 of the User's Manual (Basic)

Program example

This is an example of a program that clears reception data on the Q series C24 side.

It is assumed that the input/output signals of the Q series C24 are X/Y00 to X/Y1F.



10 TROUBLESHOOTING

This chapter explains the definitions of errors that may occur during data communication between the Q series C24 and external devices, and the corrective actions.

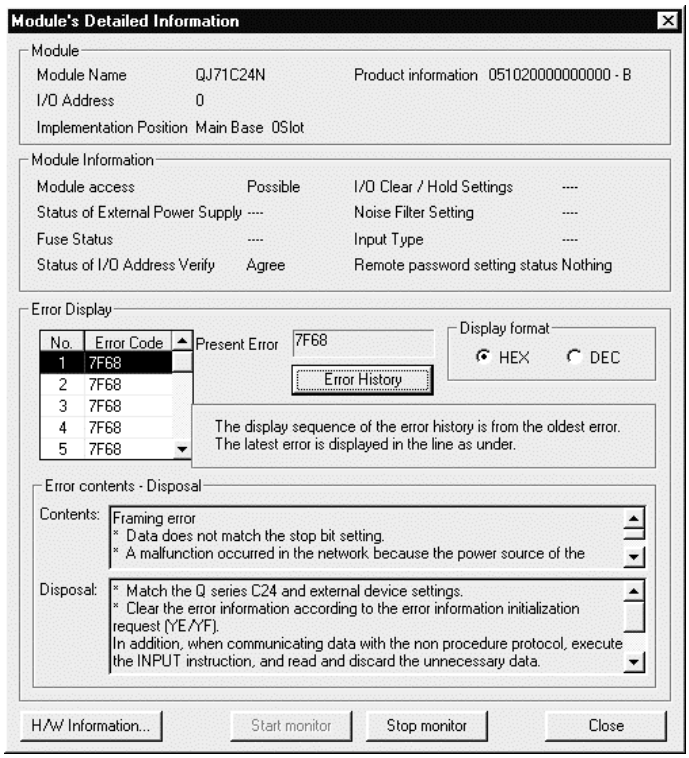
10.1 Checking the Status of the Serial Communication Module

10.1.1 Checking the LED ON status, communications error status, and switch setting status of the serial communication module

This section explains how to check the status of communication between the Q series C24 and external devices, the transmission status of the Q series C24, and the switch setting status of the Q series C24.
When a communication problem occurs, check the error status using one of the following procedures:

(1) Checking the module status and error codes in the detailed module information screen of the GX Developer diagnostic functions

[Startup procedure]
GX Developer → [Diagnostics] → [System monitor] →
Module's Detailed Information



[Displays]

- Module

  The following information is displayed:

  Module name : The name of the module installed
  I/O Address : The start input/output signal (number) of the target module
  Implementation Position: The slot position where the module is mounted
  Product information : Product information
  ∗ The last character of the product information indicates the function version of the module.
  (Example) If the last character is "B," it means that the module is of function version B.

- Unit access (Module access)

  Displays access permissions when the Ready signal (X1E) is turned on and the WDT error signal (X1F) is turned off.

- Status of I/O Address Verify

  Displays whether or not the module for which the user set the parameters matches the module installed.

- Remote password setting status

  Displays the setting status of the remote password.

- Present Error

  Displays the error code of the latest error occurrence.

- Error Display

  Displays the error codes for any errors that have occurred in any of the functions being used.

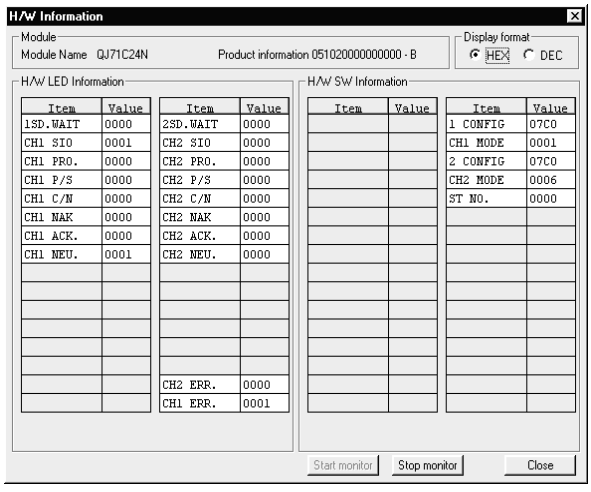
- Error details, corrective action

  Displays the error details and corrective action for the error code selected in Error Display.

(2) Checking using the hardware information screen of the GX Developer diagnostic functions

[Startup procedure]

GX Developer → [Diagnostics] → [System monitor] →
Module's Detailed Information → H/W Information



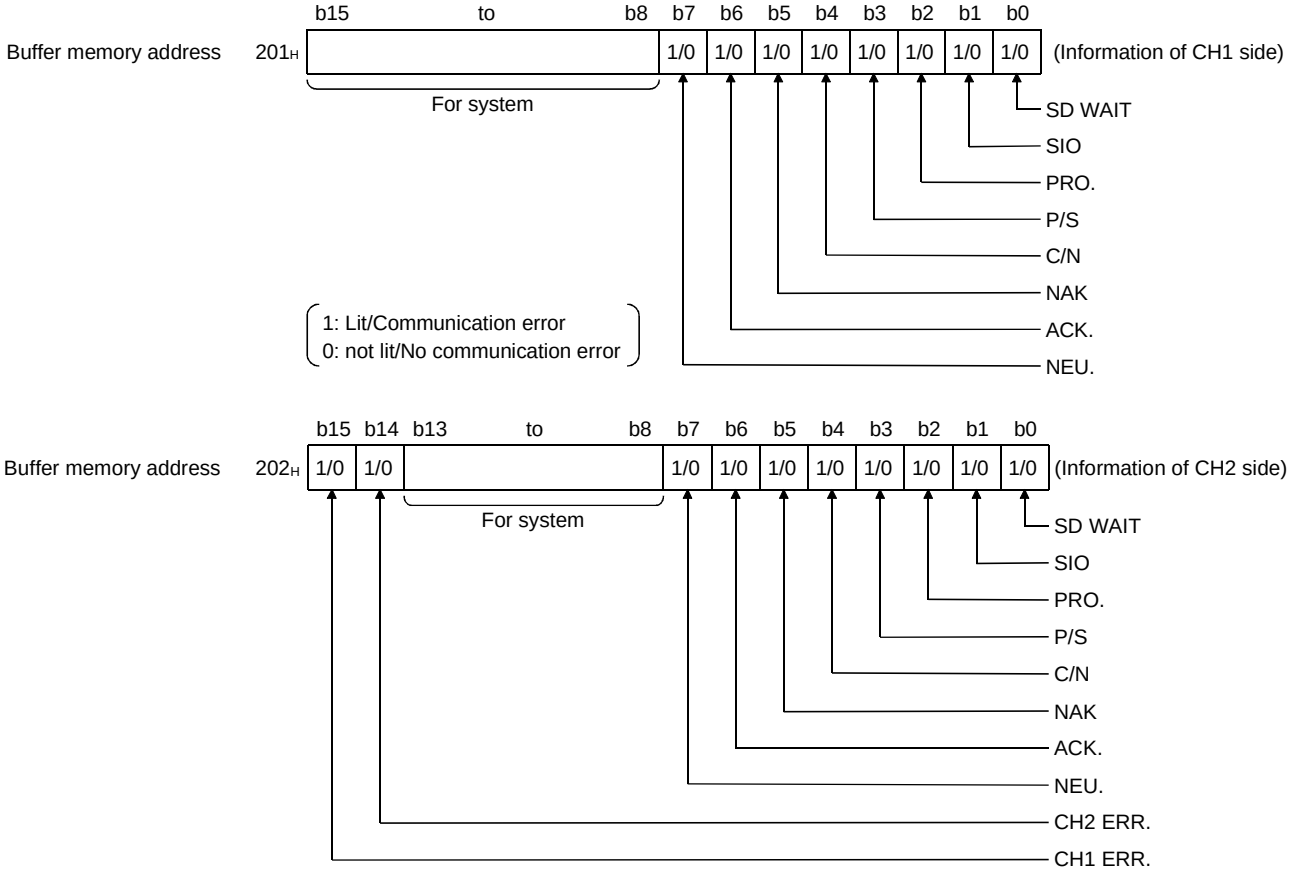
10

[Displays]

1) H/W LED Information Right side (Left side: CH1 information/
Right side: CH2 information)

Displays the transmission status and the communications error status of the Q series C24.

(Displays 201H/202H of the buffer memory.)



2) H/W SW Information Parameter

The switch information of the Q series C24 is displayed.

Numbers 1 through 5 correspond to switches 1 through 5 shown in Section 4.5.2.

(See Section 4.5.2 of the User's Manual (Basic).)

(3) Checking by GX Configurator-SC

Display the "Monitor/test others" screen.
For details on display screens, see Section 8.6.9 of the User's Manual (Basic).

(4) Description of LED ON status and communications error status

No.	Status signal name	Description	Description when ON (when LED is turned on (1))	Description when OFF (when LED is turned off (0))	Initial state	Related protocol		
						MC	Non procedure protocol	Bidirectional protocol
1	SD WAIT	Transmission wait status	Waiting for data transmission	Data transmission start	OFF	○		
2	SIO	SIO error status	Overrun or framing error occurred.	Normal	OFF	○		
			OS area is full. ＊ Received data was deleted.		OFF	—	○	
3	PRO.	Communication protocol error status	Error occurred.	Normal	OFF	○	—	
4	P/S	Status of parity error or sum check error	Error occurred.	Normal	OFF	○		
5	C/N	Access status with the PLC CPU	(＊1)	Normal	OFF	○	—	
6	NAK	Abnormal completion status	Abnormal completion transmission	Normal completion transmission	OFF			
7	ACK.	Normal completion status	Normal completion transmission	Abnormal completion transmission	OFF			
8	NEU.	Neutral status ＊ Waiting to receive command	Neutral	Command reception	(＊2)			
9	CH2. ERR	Error occurrence status on CH2 side	Switch setting error Mode switching error Transmission error Reception error On-demand error	Normal	OFF	○		
10	CH1. ERR	Error occurrence status on CH1 side			OFF			

＊1 C/N turns on in the following cases:

- An external device issued a data read request to the PLC CPU when write during RUN is set to prohibit in the switch settings by GX Developer (see Section 4.5.2).

  ＊ For functions that cannot be used when write during RUN is set to prohibit, see the explanation section in each command list of the Reference Manual.
- When an error has occurred during access between the Q series C24 and the PLC CPU.

＊2 NEU. is valid when a target interface is set to use the MC protocol.
When the target interface is set to other than the MC protocol, the status of NEU. is off.

(a) When a communication error occurs, take corrective action according to Section 10.3.

(b) The initial status of the LED ON and communications error indicates the status when the Q series C24 starts up by turning on the power or resetting the PLC CPU.

(c) Each of the communications error status, C/N to SIO, CH1 ERR. and CH2 ERR., turns on when an error occurs, and keeps its on-status even after the communication returns to normal.
The PLC CPU can check the aforementioned LED ON status and communications error status, and initialize any error information using read/write to the buffer memory of the Q series C24 and input/output signals. Initialize the error information according to Section 10.1.2.

(d) NAK to NEU. (No. 6 to 8) turn on/off depending on the status.

(e) SD WAIT turns on when data cannot be sent to the external device by the transmission control of the Q series C24 (waiting for data transmission).
- When transmission cannot be started.
- When a transmission pause request is received during data transmission. (DSR signal is off, reception by DC3)
  SD WAIT turns off when transmission becomes possible and data transmission is started/resumed.

10.1.2 Initializing error information of the serial communication module

This section explains the ERR. LED ON factors and the error code initialization (clear) for the Q series C24.

(1) ERR. LED ON factors

When any of the following errors occurs, its error code is stored in the buffer memory corresponding to the interface (CH) where the error occurred, and the ERR. LED turns on.

Cause of error	Error code storage buffer memory			Applicable protocol		
	Address		Name	MC	Non-procedure protocol	Bidirectional protocol
	CH1	CH2				
Switch setting error Mode switching error	203H		Switch setting error, mode switching error storage area	○	○	○
On-demand execution error	256H	266H	On-demand execution result storage area	○	×	×
Data transmission error	257H	267H	Data transmission result storage area	○	○	○
Data reception error	258H	268H	Data reception result storage area	○	○	○
MC protocol transmission error	025AH	026AH	MC protocol transmission error code	○	×	×
Monitoring device error	2205H	2305H	PLC CPU monitoring function execution result	○	○	○

(2) Turning off the ERR. LED and initializing the error codes by GX Configurator-SC (Refer to Section 8.6.10)

(a) When turning off the ERR. LED and initializing the error codes

By making the CH□ ERR. clear request on the "Monitor/Test" screen, the ERR. LED of the Q series C24 turns off and the stored error codes are initialized.

(b) When initializing the communication error information

By making the Communication error clear request for CH□ and to turn LED off on the "Monitor/test others" screen, the LEDs (ERR., NEU.) of the Q series C24 turn off and the communication error information is initialized.

(3) Turning off the ERR. LED and initializing the error codes by sequence program

(a) Input signals used to notify of error occurrences and output signals used to initialize the error code

I/O signal		Name of status information	Description/function
Input signal	XE	Error occurrence on CH1 side	Turns on upon error occurrence in CH1 interface.
	XF	Error occurrence on CH2 side	Turns on upon error occurrence in CH2 interface.
Output signal	YE	CH1 Error information initialization request	Turns on when initializing error code of interface on CH1 side.
	YF	CH2 Error information initialization request	Turns on when initializing error code of interface on CH2 side.

* Initialization of error code is continuously performed when output signal (YE/YF) is on.

POINT

The CHn side error information can be initialized by an off request to the LED off request area (address 1H) of the buffer memory. By using output signals YE to YF, the error codes stored in the above buffer memory can further be initialized (cleared).

(b) Initializing communication error information by writing

Communication error information can be initialized by writing "1" to the corresponding bit in the buffer memory addresses 0H to 1H.

* The displayed LEDs and communication error information may be turned on/off in the following cases:
  - NEU. to NAK turn on/off depending on the status.
  - C/N to SIO turn on when errors occur and keep the ON-status even after the operation returns to normal.

1) LED and communications error information initialization request area (address: 0H to 1H)

The contents of the error information corresponding to each bit in this request area are the same as those for the LED ON/communication error status storage area (address: 201H to 202H).

For more details, see Section 10.1.1 (1).

The following describes the correspondence between the LED OFF request areas and the LED ON status storage areas:

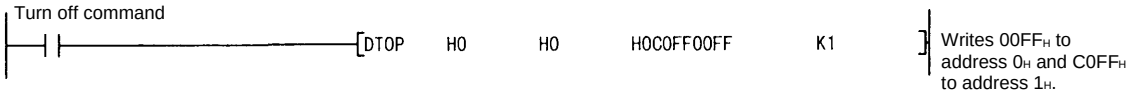
- Communication error clear request area for CH1 and to turn LED off (address: 0H) → LED ON status and communication error status area on CH1 side (address: 201H)
- Communication error clear request area for CH2 and to turn LED off (address: 1H) → LED ON status and communication error status area on CH2 side (address: 202H)

2) Example of a program for turning off displayed LEDs

The following shows an example of a program that issues an initialization request for all the communication error information of CH1 and CH2.

(Input/output signals X/Y00 to X/Y1F of QC24)

● Example of TO instruction



POINT

(1) Initialization requests are valid only when write operation is performed.
The initialization requests clear all data in the LED ON and communication error information storage area (201H to 202H) at the same time.
Furthermore, when initialization of error information on the CH1 and CH2 sides is requested, XE and XF also turn off.

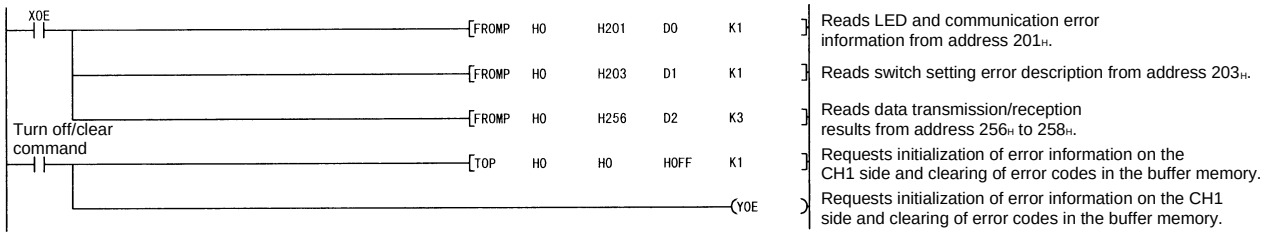
(2) Data written to the buffer memory address 0H to 1H is cleared after initialization processing.

(3) If errors persist even after completion of the initialization processing, the corresponding communication error information is stored again and the corresponding bit in the LED ON and communications error status storage area (201H to 202H) turns on (1).

(c) Examples of programs that initialize displayed LED and communication error information

The following shows examples of a program that reads error codes when errors described in (1) above occur in an interface on the CH1 side and initializes the displayed LED and communication error information.
Incorporate the necessary part of the program.
(Input/output signals X/Y00 to X/Y1F of the Q series C24)

1) When data is communicated using the MC protocol



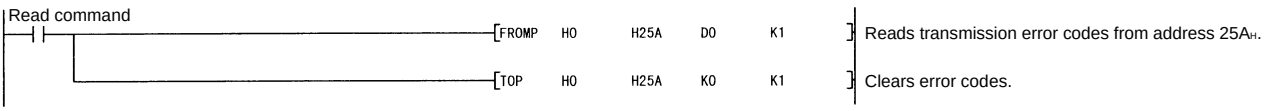
Check the error codes and take corrective action according to Section 10.2.

2) When data is communicated using the non procedure or bidirectional protocol

Check the error codes and take corrective action according to Section 10.2.

REMARK

When data is communicated using the MC protocol, the displayed ERR. LED may not be turned on if the Q series C24 sends an NAK message to the external device in response to the command message.
Error codes (see Section 10.2) corresponding to the error content when the NAK message is sent back to the external device are stored in the following areas. (when communicating with an A compatible 1C frame, the error codes differ from the transmission error code.)
When checking error codes transmitted by the PLC CPU, incorporate the following program (in case of the interface on the CH1 side).



Check the error codes and take corrective action according to Section 10.2.

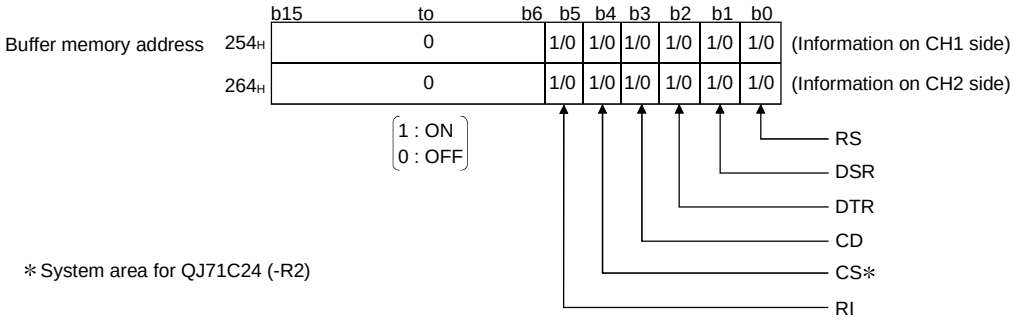
10.1.3 Reading the RS-232 control signal status

This section explains how to read the control signal status stored in the buffer memory during communication using RS-232 interface.
When GX Configurator-SC is used, check the status using the "Transmission control and others monitor/test" screen (see Section 8.6.3).

When a transmission problem occurs, read operation is executed to check the signal on/off status of the RS-232 interface.

(1) RS-232 control signal status storage area (address: 254H, 264H)

The status of the RS-232 signals is stored in buffer memory addresses 254H and 264H as follows:



REMARK

(1) For more details on signals for RS-232, see Section 3.2.1.

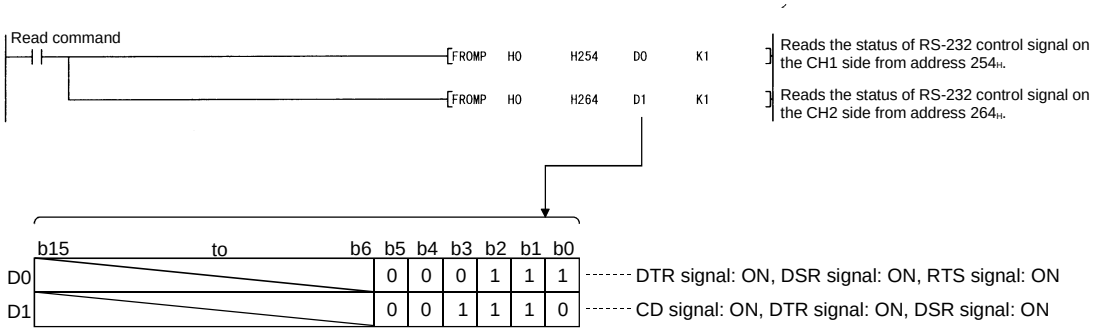
(2) Signals output from the Q series C24 side (RTS and DTR) are controlled by the operating system (OS) of the Q series C24.
They cannot be directly controlled by the sequence program.

(3) There is a maximum delay of 100 ms in signal status stored in the buffer memory above.

(2) Example of a program that reads from RS-232 control signal status storage area

The following shows an example of a program that reads the RS-232 control signal status.
(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction



10.1.4 Reading the data communication status (Transmission sequence status)

This section explains how to read the current status of the data communication using the MC protocol stored in the buffer memory.
When GX Configurator-SC is used, check the status using the "MC protocol monitor" screen (see Section 8.6.4).

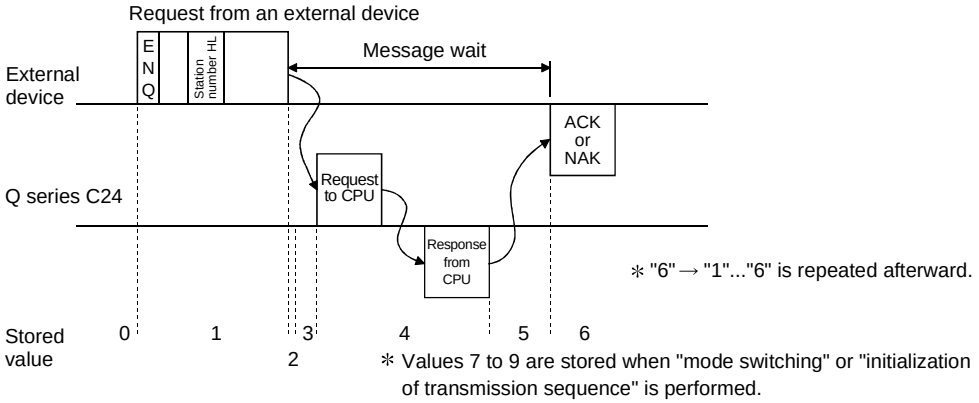
When a transmission problem occurs, read operation is executed to check the status of the data communication using the MC protocol.

(1) Transmission sequence status storage area (address: 255H and 265H)

The status of data communication using the MC protocol is stored as a numerical value in buffer memory addresses 255H and 265H.

		b15 to b0	
Buffer memory address	255H	0 to 9	(Information on the CH1 side)
	265H	0 to 9	(Information on the CH2 side)

The following shows the correspondence between the numerical values in the transmission sequence status storage area and the data communication status.



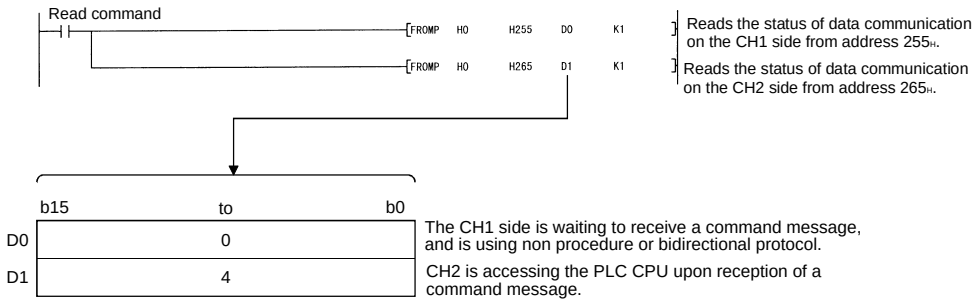
REMARK

When the target interface is not set to use the MC protocol, "0" is stored in the transmission sequence status storage area.

(2) Example of a program that reads from transmission sequence status storage area

The following shows an example of a program that reads from the transmission sequence status storage area.
(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction



10.1.5 Reading the switch setting status

This section explains how to read the switch setting status of the Q series C24.
When GX Configurator-SC is used, check the status in the "Monitor/test others" screen (see Section 8.6.9).

REMARK

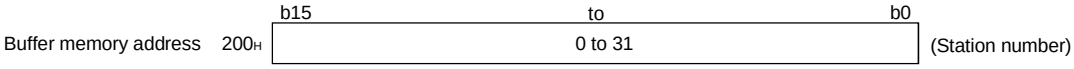
(1) The switch settings can be changed when the mode is switched or when the UINI instruction is executed. (The station No. setting can be changed only when the UINI instruction is executed.)
For the mode switching, refer to Chapter 15 of the User's Manual (Application).
For the UINI instruction, refer to Chapter 17 of the User's Manual (Application).

(2) For the switch settings, refer to Section 4.5.

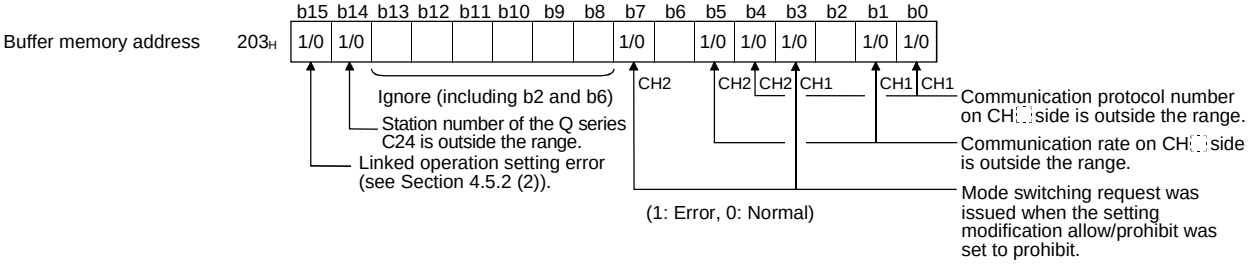
(1) Setting status storage area

The switch settings by GX Developer and setting error information are stored in different areas of the buffer memory shown below.

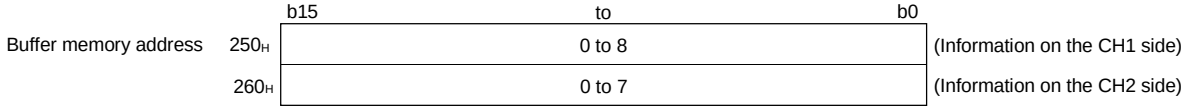
1) Station number storage area (address: 200H)



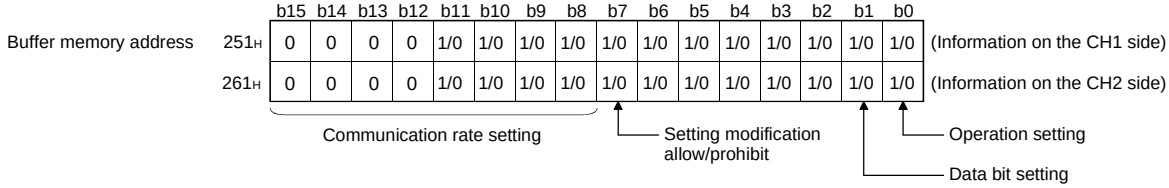
2) Switch setting error/mode switching error storage area (address: 203H)



3) Communication protocol storage area (address: 250H and 260H)



4) Transmission setting status storage area (address: 251H and 261H)



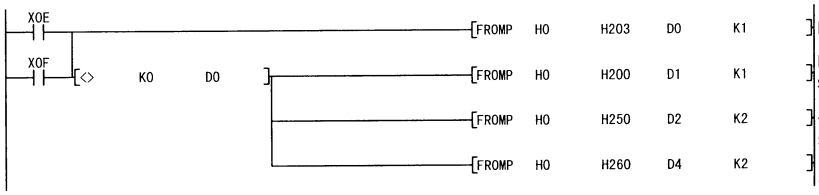
(2) Example of a program that reads from the setting status storage area

The following shows an example of a program that reads the setting of various switches of the Q series C24 from the setting status storage area.

For details on XE and XF of the input/output signals used in the program, see Section 10.1.2 (3).

(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction



Reads error description from address 203H.

Reads station number setting and switch setting description from address 200H.

Reads communication protocol setting and transmission setting description on the CH1 side from addresses 250H to 251H.

Reads communication protocol setting and transmission setting description on CH2 from addresses 260H to 261H.

Restarts the Q series C24 after checking the error code and resetting switches.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
D0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Error description (1: Communication protocol number setting error)
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Setting station number of the Q series C24 (0).
D2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	CH1 side: Communication protocol setting number (9).
D3	0	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	CH1 side: (transmission setting description)
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	CH2 side: Communication protocol setting number (1).
D5	0	0	0	0	0	1	0	1	0	1	1	0	1	0	1	0	CH2 side: (transmission setting description)

Displays communication protocol number setting error status on the CH1 side

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10.1.6 How to read the current operation status

This section explains how to read the current operation status of the Q series C24. When GX Configurator-SC is used, check the status in the "Transmission control and others monitor/test" screen (see Section 8.6.3).

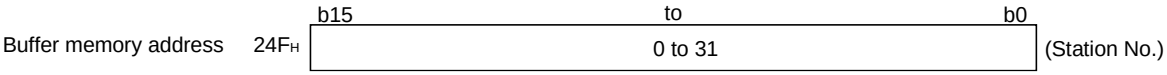
REMARK

- The status of the switch settings by GX Developer can be checked by performing read operations as described in Section 10.1.5.
- Refer to Section 4.5 for the switch settings.

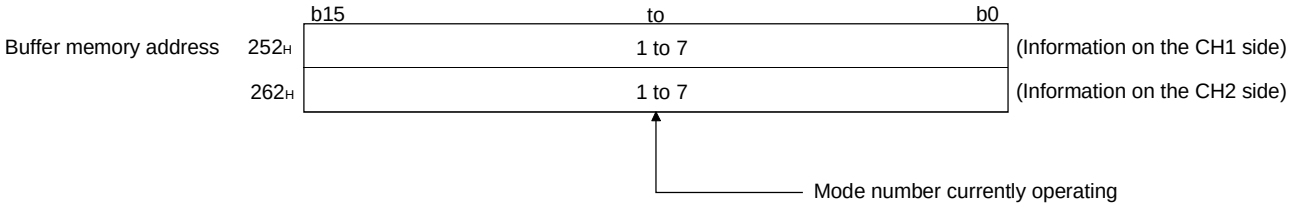
(1) Operation mode status storage area

The current operation status of the Q series C24 is stored into the following buffer memory areas.

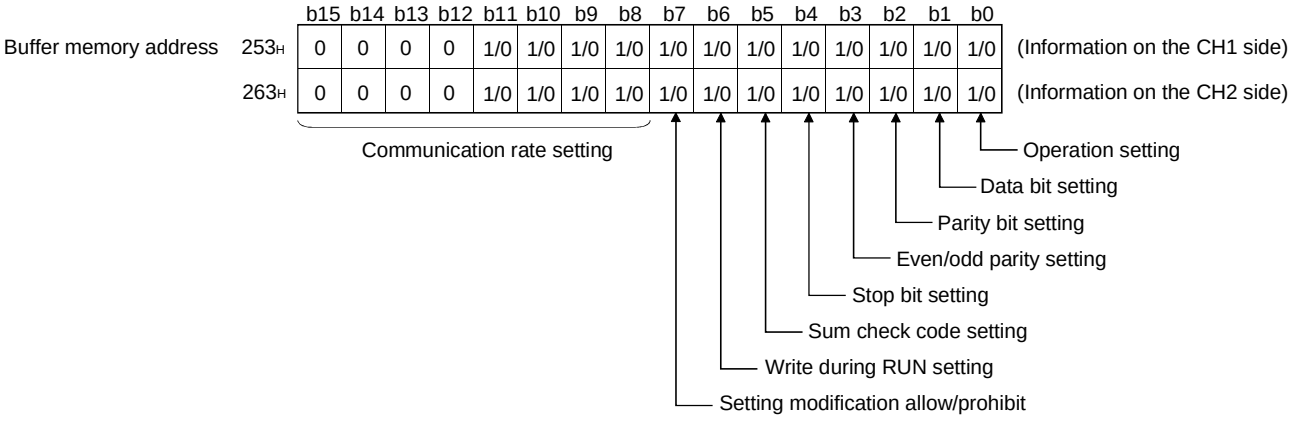
1) Station No. storage area (address: 24F$_H$)



2) Communication protocol status storage area (addresses: 252$_H$ and 262$_H$)



3) Transmission status storage area (address : 253$_H$, 263$_H$)



(2) Example of a program that reads from the current setting status storage area

The following shows an example of a program that reads from the switch setting status storage area for current operation of the Q series C24.

For details regarding XE and XF of the input/output signals used in the program, see Section 10.1.2 (3).

(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction

After checking error codes and changed setting values, designate the correct setting values and switch mode.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
D0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Communication protocol Error description (2: Communication rate error)
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	CH1 side: Setting communication protocol number 6 (transmission setting description)
D2	0	0	0	0	1	1	1	1	0	0	0	0	1	0	1	0	
D3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	CH2 side: Setting communication protocol number 1 (transmission setting description)
D4	0	0	0	0	0	1	0	1	0	1	1	0	1	0	1	0	
D5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Station No. 1 being set.

While the CH1 side is set to the non procedure protocol and the CH2 side is set to the MC protocol (format 1), this indicates the communication rate setting error on the CH1 side.

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10.2 Error Code Tables

The following shows the error codes, error contents, and corrective action for errors that are generated during communication between the Q series C24 and an external device.
The signal name in the following table indicates the CH□ side LED on status or communication error status that is stored into buffer memory address 201H/202H when an error occurs.
The CH□ side LED on status and communication error status can be confirmed by GX Developer's System monitor or GX Configurator-SC. (Refer to Section 10.1.1.)
For errors without a corresponding signal name entered to errors generated with the MC protocol communication, “NAK” comes on.

10.2.1 Error code table

The following shows the error codes, error contents, and corrective action for errors generated during communication using MC protocol (excluding A compatible 1C frame), non procedure protocol, and bidirectional protocol.
("*" in the table is the error code when the target CPU is not a Q/QnACPU.)

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
3E8H to 3FFFH	—	(Error detected by the CPU)	—	• See Troubleshooting of the QCPU (Q mode) maintenance and inspection user's manual and take corrective action.	○		
4000H to 4FFFH	—	(Error detected by the CPU)	—	• See Appendix of the QCPU (Q mode) maintenance and inspection user's manual (details) and take corrective action.	○		
7101H 7102H	System error	• The OS of the Q series C24 detected some error.	—	(*1)			
7103H	PLC access error	• Cannot communicate with the Q series C24 CPU.	C/N	• Make the watchdog timer (timer 1) time longer. • Check if the CPU can communicate in communication protocol No. "F".	○		
7104H to 7116H	System error	• The OS of the Q series C24 detected some error.	—	(*1)			
7140H *	Request data error	• Number of request points exceeds the range for the command. • A word device was designated in a bit units command. • The last device No. exceeds the range. (Given device last No. ≥ Designated head device No. + Designated number of points)	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7141H	System error	• The OS of the Q series C24 detected some error.	—	(*1)			
7142H *	Device name error	• A device that cannot be designated by the given command was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7143H *	Device No. error	• The head device No. is out of range.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7144H *	Monitor data write error	• Monitoring was requested before the device to be monitored was written.	PRO	• Write the device to be monitored before issuing a monitor request.	○		
7145H *	Monitor PLC No. error	• The written PLC No. and PLC No. in the monitor request are different.	C/N	• Rewrite the monitor data.	○		
7146H *	Monitor CPU model name error	• The written CPU model name and the CPU monitor name in the monitor request are different.	C/N	• Rewrite the monitor data.	○		
7147H *	Written number of monitoring points overrun error	• The written number of monitoring points exceeds the designated range.	PRO	• Check and correct the external device transmit message and restart data communications.	○		

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
7148H *	Extension R block No. error	• A nonexistent extension file register block No. was designated. • A block No. being used as an extension comment area, sampling trace area, or status latch area was designated.	PRO	• Correct the designated block No. and restart data communications.	○		
7149H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
714AH *	Cannot execute a command during RUN	• A write command was designated when "Disable write during RUN" was set. • Parameter or sequence program was written during RUN.	C/N	• Change the setting to "Enable write during RUN" and restart data communications. • Stop the CPU and restart data communications.	○		
714BH to 714DH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
714EH *	Monitor network No. error	• The written monitor network No. and the monitor request network No. are different.	C/N	• Check and correct the other station access valid module No. in the network parameters. • Rewrite the monitor data.	○		
7150H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7151H	PLC No. designation error	• A PLC No. other than "FF" or "0 to 64(00H to 40H)" was designated.	C/N	• Check and correct the external device transmit message and restart data communications.	○		
7152H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7153H	Frame length error	• The received message length has exceeded the allowable range.	CHn ERR.	• Review the transmission message. • Correct the message format so the number of access points is within the allowable range.	○		
7154H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7155H	Unwritten monitor data error	• Monitoring was requested before monitor data was written.	PRO	• Write the device to be monitored before issuing a monitor request.	○		
7156H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7160H	PLC access error	• CPU model name cannot be confirmed.	C/N	• If there is an error in the CPU, remove the CPU error and restart data communications.	○		
7161H to 7163H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7164H	Request error	• Either the request or the device designation method is wrong.	—	• Check the transmission message/request from the external device, make the necessary corrections, and send again.	○		
7166H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7167H	Cannot execute a command during RUN	• A write command was designated when "Disable write during RUN" was set.	C/N	• Change the setting to "Enable write during RUN" and restart data communications.	○		
7168H		• A command that cannot be executed during RUN was designated.	C/N	• Stop the CPU and restart data communications.	○		
7169H	CPU error	• Cannot communicate normally with the CPU.	C/N	• If there is an error in the CPU, remove the CPU error and restart data communications.	○		
716AH to 716CH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
716DH	Monitor data write error	• Monitor data was not written using QnA compatible 2C/3C/4C frame.	PRO	• Rewrite monitor data.	○		
716EH		• Monitor data was not written using A compatible 1C frame.	PRO				

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Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
716F$_H$	Device error	• A nonexistent device was designated. • Device that cannot be specified by the corresponding command was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7170$_H$	A compatible 1C frame error	• Number of access points exceeded the range.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7171$_H$		• A device that cannot be designated was designated.	PRO		○		
7172$_H$		• Written number of monitoring points is incorrect. For example, [0] was designated.	PRO		○	○	○
7173$_H$	Monitor data write error	• Monitor data was written for a CPU other than a Q/QnACPU using QnA compatible 2C/3C/4C frame.	PRO	• Write the monitor data and use the A compatible 1C frame to a CPU other than a Q/QnACPU.	○		
7E00$_H$ to 7E05$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E06$_H$	Buffer memory address setting error	• Transmit/receive buffer memory addresses are in the special applications area.	—	• Change the buffer memory addresses so that they are outside the special applications area.			
7E07$_H$ to 7E0A$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E40$_H$	Command error	• A nonexistent command or subcommand was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7E41$_H$	Data length error	• A data length exceeding the number of points that can communicate during random read/write was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7E42$_H$	Error count error	• Number of requested points exceeds the range for the command.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7E43$_H$	Device error	• A nonexistent device was designated. • Device that cannot be specified by the corresponding command was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○	○	
7E44$_H$	Timer 1 time-out error	• A response message was not returned within the response monitoring time (timer 1) monitoring time.	C/N	• Make the timer 1 monitoring time longer. • When accessing another station's CPU, check if the routing parameters match.	○		
7E46$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E47$_H$	Continuous request error	• The next request was received before a response message was returned for the preceding request.	PRO	• Do not issue continuous requests from the external device. • Set the timer 1 monitoring time to the external device time-out time.	○		
7E48$_H$ to 7E4C$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E4D$_H$	Error during data transmission	• Mode switching was executed during data transmission.	CHn ERR.	• Make arrangements between the target device and PLC CPU so that mode switching is not executed during data transmission.	○	○	
7E4E$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E4F$_H$	Device point count error	• Access point count is incorrect.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7E50$_H$	User frame No. designation error	• A user frame No. outside the range was designated.	PRO	• Check and correct the external device transmit message and restart data communications. • Recheck the frame No..	○	○	
7E51$_H$	Unwritten user frame error	• An unwritten user frame No. was designated.	PRO	• Write the frame beforehand. • Change the frame No. and restart data communications. • Recheck the frame No..	○	○	

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
7E52H	User frame overwrite error	• A written frame No. overwrite request was issued.	PRO	• Change the write destination to an unwritten frame No. • When overwriting, delete the given No. beforehand.	○		
7E53H	User frame access data error	• A nonexistent command was designated in a subcommand. • Byte count exceeding the number of bytes that can be requested was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7E54H	Modification allowed error	• Flash ROM write allow/prohibit designation from GX Configurator-SC is set to OFF. • At the switch setting on GX Developer, modification allowed switch was set to OFF.	PRO	• Set to ON at GX Configurator-SC. • Set to ON at GX Developer.	○	○	○
7E55H	User frame data error	• There is an error in the user frame variable data.	PRO	• Check and correct the external device transmit message and restart data communications.	○	○	
7E56H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E57H	Flash ROM write error	• Cannot write to Flash ROM normally.	PRO	• Re-execute the write operation. If the error is generated again, replace the module.	○		
7E58H	Mode modification error	• There was an error in the mode No. or transmission specification designated contents when changing the mode.	PRO	• Check and correct the contents of the external device transmit message and restart data communications. • Recheck the switch setting on the Q series C24.	○	○	○
7E59H	Flash ROM write count over limit error	• Flash ROM written 1,000 times	—	• Review the program. • Rewrite the flash ROM area (address: 2401H) of the buffer memory to 0 and restart data communications.	○	○	○
7E5FH	I/O number error on requested module	• I/O number of requested module is incorrect.	—	• Correct the I/O number of the module to which data is sent.	○	○	
7E60H	Device monitoring duplicate registration error	• PLC CPU monitoring registration was performed twice.	—	• Cancel the PLC CPU monitoring and perform the PLC CPU monitoring registration again.	○	○	
7E61H	Cycle time units range error	• Setting value of cycle time units is out of range.	—	• Correct the setting value of the cycle time units.	○	○	
7E62H	PLC CPU monitoring function error	• Setting value of PLC CPU monitoring function is out of range.	—	• Correct the setting value of the PLC CPU monitoring function.	○	○	
7E63H	Transmission measure setting error	• Setting of transmission measure of the PLC CPU monitoring is incorrect.	—	• Correct the setting value of the transmission measure.	○	○	
7E64H	Registration point range error	• Registration point (word/bit) is out of range.	—	• Correct the setting value of the registration point (word/byte)	○	○	
7E65H	PLC CPU abnormal monitoring number error	• Setting value of the PLC CPU abnormal monitoring is out of range.	—	• Correct the setting value of the PLC CPU abnormal monitoring.	○	○	
7E66H	Monitoring condition error of monitoring device	• Setting value of transmission condition is out of range.	—	• Correct the setting value of the transmission condition.	○	○	
7E67H	CPU abnormal monitoring setting value error	• Setting value (fixed value) of CPU abnormal monitoring is out of range.	—	• Correct the setting value (fixed value) of the CPU abnormal monitoring.	○	○	
7E68H	Transmission condition range error of monitoring device	• Setting value of transmission condition (condition agreement transmission) is out of range.	—	• Correct the setting value of the transmission condition (condition agreement transmission).	○	○	
7E69H	CPU abnormal monitoring setting value error	• Setting value (fixed value) of CPU abnormal monitoring is out of range.	—	• Correct the setting value (fixed value) of the CPU abnormal monitoring.	○	○	

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
7E6A$_H$	Monitoring device read point range error	• Read point of monitoring device is out of range.	—	• Correct the setting value of the read point of the monitoring device.	○	○	
7E6B$_H$	CPU abnormal monitoring setting value error	• Setting value (fixed value) of CPU abnormal monitoring is out of range.	—	• Correct the setting value (fixed value) of the CPU abnormal monitoring.	○	○	
7E6C$_H$			—		○	○	
7E6D$_H$			—		○	○	
7E6E$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7E6F$_H$	Modem connection error	• Modem is connected to an incorrect channel.	—	• Correct the C$_H$ to which notification is sent.	○	○	
7E70$_H$	CPU error	• The communication with the CPU could not be performed normally.	C/N	• If there is an error in the CPU, eliminate the error on the CPU side and communicate again.	○	○	
7E81$_H$ to 7E8E$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7EC1$_H$							
7EC2$_H$							
7EC3$_H$	Double send request error	• A send request was performed while another send request was being processed.	—	• Interlock (handshake) the send requests.		○	○
7EC4$_H$	Transmission data count error Transmission/ receipt buffer setting error	• Data larger than the transmit buffer size was transmitted. • Transmission/receipt buffer settings out of range.	—	• Make the transmission data count smaller than the transmit buffer size. • Make the non procedure protocol transmit buffer size larger. • Designate the first address and size of transmission/receipt buffer in the free area range of the user.	○	○	○
7EC5$_H$	Flash ROM access error	• Write to Flash ROM was requested when the setting modification enable/disable switch in the GX Developer was set to OFF.	—	• When writing to Flash ROM, set switch shown left of the given interface to ON and restart the Q series C24.	○	○	○
7EC6$_H$	Flash ROM access error	• There is an error in the Flash ROM read/write request contents.	—	• Check the read/write request data and designate the correct data.	○	○	○
7F00$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7F01$_H$	Buffer full error	• The next data was received before processing of the previous data was completed.	—	• Increase the transmission time by performing handshake with the external device, etc.	○		○
		• Multiple requests was simultaneously issued for one channel.		• Perform handshake with the request source external device.	○	○	○
7F02$_H$ to 7F06$_H$	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7F20$_H$	ASCII → BIN conversion error	• An ASCII code that cannot be converted to binary code was received.	PRO	• Check and correct the external device transmit message and restart data communications.		○	○
		• An odd number of bytes of data was received during data communications using ASCII ← → BIN conversion.		• When communicating using ASCII ← → BIN conversion, always transmit the data in even number bytes units.			
7F21$_H$	Receive header area error	• There is an error in the command (frame) part.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
		• An ASCII code that cannot be converted to binary code was received.					
7F22$_H$	Command error	• A nonexistent command or device was designated. • The remote password length is wrong.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
7F23$_H$	MC protocol message error	• There is no data (ETX, CR-LF, etc.) following the character area, or designation was incorrect.	PRO	• Check and correct the external device transmit message and restart data communications.	○		

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Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
7F24H	Sum check error	• The sum check calculated by the Q series C24 and the received sum check are not the same.	P/S	• Recheck the external device sum check.	○	○	
7F25H	Data length error	• The length of the received data exceeds the receive area size.	CHn ERR.	• Correct the "data length" that is transmitted from the external device. • Change the "word/byte units" set by the Q series C24 to byte units. • Increase the receiving area of the Q series C24.			○
7F26H	Command error	• Another command was received before an unlock processing while the remote password is registered.	CHn ERR.	• Perform the communication after the unlock processing is normally completed.	○		
7F30H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7F31H	Simultaneous transmission error	• The Q series C24 and an external device started transmitting simultaneously.	—	• Process by agreement with the external device. • When necessary, change the simultaneous transmission data valid/invalid designation setting by GX Configurator-SC. (buffer memory addresses 9BH/13BH)			○
7F32H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7F40H	Time-out error	• No reception watchdog timer (timer 0) time-out occurred.	PRO	• Check if data was dropped from the receive data. • Check if DTR control, etc. interrupted reception.	○	○	○
7F41H		• Response watchdog timer (timer 1) time-out occurred.	—	• Check the status of the message transmission destination and restart data communications, as required.	○		○
7F42H		• Transmit watchdog timer (timer 2) time-out occurred.	—	• Check if DTR control, etc. interrupted transmission.	○	○	○
7F50H to 7F54H 7F60H to 7F66H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7F67H	Overrun error	• The Q series C24 received the next data before it completed receive processing of the previous data.	SIO	• Decrease the data transmission rate and restart data communications. • Check whether a temporary stop has occurred in the station in which the Q series C24 is installed. (For the QCPU this can be checked using special register SD1005.) If a temporary stop has occurred, remove its cause.	○	○	○
7F68H	Framing error	• Data does not match the stop bit setting. • A malfunction occurred in the network because the power source of the partner station was on or off. • Noise occurs in the network. • When the multidrop was connected, data was transmitted simultaneously by multiple devices.	SIO	• Match the Q series C24 and external device settings. • Clear the error information according to the error information initialization request (YE/YF). In addition, when communicating data with the non procedure protocol, execute the INPUT instruction, and read and discard the unnecessary data. • Measure the noise. • When connecting the multidrop, remove the interlock so that data will not be transmitted simultaneously by multiple devices.	○	○	○

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
7F69H	Parity error	• Data does not match the parity bit setting. • A malfunction occurred in the network because the power source of the partner station was on or off. • Noise occurs in the network. • When the multidrop was connected, data was transmitted simultaneously by multiple devices.	P/S	• Match the Q series C24 and external device settings. • Clear the error information according to the error information initialization request (YE/YF). In addition, when communicating data with the non procedure protocol, execute the INPUT instruction, and read and discard the unnecessary data. • Measure the noise. • When connecting the multidrop, remove the interlock so that data will not be transmitted simultaneously by multiple devices.	○	○	○
7F6AH	Buffer full error	• OS receive buffer overflowed and receive data was skipped.	SIO	• Use DTR and DC control and perform data communications so that the buffer does not become full. (Perform RS · CS control when the modem function is used.) • If the Read Request signal was turned ON, execute read immediately.	○	○	○
7F6BH	CD signal control error	• Data was received when CD signal is OFF when "CD terminal check enabled" was designated.	CHn ERR.	• Recheck the CD signal control of the external device. (Send while the CD signal is ON.) • Set "no CD terminal checking" and perform communication.	○	○	○
7F6CH	Transmission error	• Data cannot be sent because the line is not connected.	CHn ERR.	• Transmit data after line connection processing on the interface side that uses the modem function.	○	○	○
7F91H to 7F96H 7F98H to 7F9AH 7F9DH 7F9EH 7FA0H to 7FA3H 7FA8H 7FAAH to 7FADH 7FAFH to 7FB2H 7FB5H 7FB6H 7FB8H to 7FBCH 7FC0H to 7FC4H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			

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Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
7FC9H to 7FCFH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7FE6H	Processing disabled	• Remote passwords do not match.	—	• Check the remote password and communicate again.	○		
7FE7H		• The remote password is not registered. • The remote password processing command was received on the interface side where the modem function is not used. • The GX Developer connection is selected in the communication protocol setting on the corresponding CH.	CHn ERR.	• A remote password processing command is not necessary when a remote password is not registered. • Perform a remote password unlock processing through GX Developer. Alternatively, change the communication protocol setting of the corresponding CH to the MC protocol.	○		
7FE8H		• The number of remote password disagreements exceeded the value designated at the address 200DH.	CHn ERR.	• Clear the storage area of the cumulative number of abnormal completions of unlock processing (address: 22FCH) to 0.	○		
7FEFH	Switch setting error	• There is an error in the switch setting by the GX Developer	CHn ERR.	• Write CPU to the parameter and reboot after correcting the setting value for the switch.	○	○	○
7FF0H	Dedicated instructions simultaneous execution error	• Executed dedicated instructions simultaneously.	—	• Do not use dedicated instructions simultaneously.	○	○	
7FF1H	Control data error	• Setting value is incorrect. • Setting value is out of range.	—	• Correct the setting value in the control data.	○	○	
7FF2H	Communication protocol setting error	• Instruction cannot be executed with the current communication protocol.	—	• Correct the setting value of the communication protocol.	○	○	
7FF3H to 7FF4H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
7FF5H	Processing canceled due to mode switching/transmission sequence initialization	• The processing was canceled due to mode switching or receive data clear executed during the processing.	—	• Do not execute mode switching/receive data clear during any processing.	○	○	
7FF7H	Simultaneous access error	• Multiple external devices accessed a remote station on the same network at the same time.	—	• Multiple external devices must not access a remote station on the same network at the same time.	○		
7FF8H 7FFFH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)			
B000H to BFFFH	—	• Errors detected by the CC-Link module	—	• Take corrective action by referring to the CC-Link Master/Local Module User's Manual.	○		
C000H to CFFFH	—	• Errors detected by the Ethernet module	—	• Take corrective action by referring to the Ethernet Interface Module User's Manual.	○		
F000H to FFFFH	—	• Errors detected by the MELSECNET/H, MELSECNET/10 network system	—	• Take corrective action by referring to MELSECNET/H, MELSECNET/10 network system reference manual.	○		

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*1 Take corrective action in the following procedure.

1) Check whether the Q series C24, power supply module and CPU module are mounted correctly on the base unit.
2) Check whether the operating environment of the Q series C24 is within the general specifications range of the CPU module.
3) Check whether the power supply capacity is sufficient or not.
4) Check whether the hardware of the Q series C24, CPU module and base unit are normal according to the manuals of the corresponding modules.
   If any module is faulty, please contact your local Mitsubishi service center or representative for repair.
5) If the problem cannot be solved through the above steps, please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

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10.2.2 A compatible 1C frame communications error code table

The following table lists the error code, error contents, and corrective action for errors generated during A compatible 1C frame communications.

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol		
					MC	Non Proce-dure	Bidire-ctional
00H	Disable during RUN	• A write command was designated when "Disable write during RUN" was set. • Parameter or sequence program was written during RUN.	C/N	• Change the setting to "Enable write during RUN" and restart data communications. • Stop the CPU and restart data communications.	○		
01H	Parity error	• The data does not match the parity bit setting.	P/S	• Match the Q series C24 and external device settings.	○		
02H	Sum check error	• The sum check calculated by the Q series C24 and the transmitted sum check are not the same.	P/S	• Check the external device sum check.	○		
03H	Protocol error	• Received message that is different from the control procedure with the communication protocol setting.	PRO	• Check and correct the external device transmit message and restart data communications.	○		
04H	Framing error	• The data does not match the stop bit setting.	SIO	• Match the Q series C24 and external device settings.	○		
05H	Overrun error	• The next data was received before the Q series C24 received all the preceding data.	SIO	• Decrease the transmission rate and restart data communications.	○		
06H	Character area error	• Designation method error in part of a message. • A command that does not exist was designated. • The number of processing points is outside the range for the command. • A device that does not exist was designated.	PRO	• Check and correct the external device transmit message and restart data transmission.	○		
07H	Character error	• Received data that cannot be used.	PRO		○		
08H	PLC access error	• The CPU cannot communicate with the Q series C24.	C/N	• Replace the CPU with a CPU that can communicate with the Q series C24.	○		
10H	PLC No. error	• The PLC No. is not "FF", or a station No. set in the network parameters.	C/N	• Check and correct the external device transmit message and restart data communications.	○		
11H	Mode error	• An error was detected upon access to the PLC CPU.	—	• Send again. • Conduct individual station recovery test and check the Q series C24.	○		
12H	Special function module designation error	• A special function module does not exist at the specified position.	C/N	• Check and correct the external device transmit message and restart data communications.	○		
21H	Special function module bus error	• An error was detected upon access to a special function module at the specified position.	C/N	• Check the error and take corrective action according to the manual of the corresponding module.	○		
42H	Other errors	* See POINT .			○		

POINT

- If an error occurs during A compatible 1C frame communications, the Q series C24 adds a 2-character error code (00H to 10H, 42H) to the "NAK" code and returns the "NAK" code to the external device and stores the error code (equivalent to QnA compatible 2C/3C/4C frame error code) to buffer memory address 25AH (CH1) or 26AH (CH2).
  The exact error contents can be checked by reading the value stored to the buffer memory.
  See Section 10.2.1 for a detailed description of the error codes.

10.2.3 Error code list while modem function is used

The following describes the error codes, contents and corrective actions for errors (including errors at the abnormal completion) that may occur while the Q series C24 modem function is used.
The error codes for the modem function are stored in the modem function error code storage area (address : 221H(545)) of the buffer memory.

* The reference pages listed in the table below are found in the User's Manual (Application).

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Reference section
7FD0H	Modern function error	There is an error in the designation of the notification execution.	CHn ERR.	Set 0 to 1 to the notification execution designation.	Section 3.3.6
7FD1H		There is an error in the designation of the number of connection retries.		Set the number of connection retries in the range of 1 to 5.	
7FD2H		There is an error in the designation of the connection retry interval.		Set the connection retry interval in the range of 90 to 300 (s).	
7FD3H		There is an error in the initialization/connection time-out designation.		Set the initialization/connection time- out in the range of 1 to 60 (s).	
7FD4H		There is an error in the designation of the number of initialization retries.		Set the number of initialization retries in the range of 1 to 5.	
7FD5H		There is an error in the designation of the data number for initialization.		Designate the registered data number for initialization, or 0.	Section 3.3.6 Section 3.4.5
7FD6H		There is an error in the data for connection designated by the data number for connection.		Recheck the pager receiver designation.	Section 3.4.4
7FD7H				Recheck the dialing number of the external line.	
7FD8H	System error	The OS of the Q series C24 detected some error.	—	(* 1)	—
7FD9H	Modern function error	External destination is connected to network or modem has not been initialized.	CHn ERR.	After the modem has been initialized, connect to the network if the external destination is not connected to the network or report it.	Section 3.4.6 Section 3.4.7
7FDAH		There is an error in the designation of the data number for connection.		Designate a registered number for the data for connection.	Section 3.3.6 Section 3.4.6
7FDBH		There is an error in the designation of the GX Developer connection.		Set 0 to 1 to the GX Developer connection designation.	Section 3.3.6
7FDCH		There is an error in the data for connection designated by the data number for connection.		Recheck the waiting time for the notification-message part of the message transmission.	Section 3.4.4
7FDDH		A connection time-out error occurred.		• Recheck the telephone number in the data for connection. • Check if the destination is ready for a connection. • Recheck the set value of the connection time-out. • Recheck the initialization command.	Section 3.3.6 Section 3.4.3 Section 3.4.4
7FDEH		Connection to the modem/TA was unsuccessful, or the modem/TA is not connected.		• Check if there is any problem with the modem/TA by seeing the operation manual of the modem/TA. • Connect the modem/TA to the Q series C24. • Check the connection cable by seeing the operation manual of the modem/TA.	—
7FDFH		Modem connection channel number is not designated.	—	Set 1 to 2 to the modem connection channel designation.	Section 3.3.6
7FE0H		Designated value of modem connection channel is incorrect.			

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Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Reference section
7FE1H	Modern function error	There is an error in the designation of the user frame number.	CHn ERR.	• Recheck the user frame number. • Designate the registered user frame number. • Register the designated data for initialization.	Section 3.4.3 Section 3.4.4 Section 3.4.5
		There is an error in the designation of the output head pointer.		• Designate the output head pointer in the range of 1 to 100. • Designate the position (n-th position) where the data for initialization number is designated. • Designate the data for initialization number at the designated position (n-th position).	Section 3.4.5
7FE2H		There is an error in the designation of the output frame number.		Designate a registered data for initialization number within the range of the designated number of outputs from the location of the output head pointer.	
7FE3H		There is an error in the designation of the number of registered data bytes.		• Designate the data for initialization in the range of 1 to 78. • Designate 80 for the data for connection.	Section 3.4.3 Section 3.4.4
7FE4H		There is an error in the data for connection.		• Recheck the message length of the message for notification.	Section 3.4.4
7FE5H		There is an error in the designation of the no-communication interval time.		• Designate the no-communication interval time in the range of 0 to 120.	Section 3.3.6
7FE8H		The number of remote password mismatch exceeded the value designated at the address 200DH.		• Clear the storage area of the Accumulated count of unlock process abnormal completion (address: 22FCH) to 0.	Section 3.3.3
7FE9H		Callback denial exceeded the value designated at the address 2002H		• Clear the storage area of the callback denial accumulated count (address: 22F1H) to 0.	Section 3.3.4

*1 Take corrective action in the following procedure.

1) Check whether the Q series C24, power supply module and CPU module are mounted correctly on the base unit.
2) Check whether the operating environment of the Q series C24 is within the general specifications range of the CPU module.
3) Check whether the power supply capacity is sufficient or not.
4) Check whether the hardware of the Q series C24, CPU module and base unit are normal according to the manuals of the corresponding modules.
   If any module is faulty, please contact your local Mitsubishi service center or representative for repair.
5) If the problem cannot be solved through the above steps, please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

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10.3 Troubleshooting by Symptom

This following shows troubleshooting of trouble generated during communications between the Q series C24 and external device according to the trouble symptom. When trouble occurs, first confirm the status of the Q series C24 and check the relevant item in the table below.

Symptom	Symptom description	Protocol			Reference section
		Dedicated	Non procedure	Bidirec-tional	
LED turns on/off (check according to Section 4.3)	• "RUN" LED turned off.	○	○	○	Section 10.3.1
	• "RD" does not blink even through an external device is transmitting a message.	○	○	○	Section 10.3.2
	• An external device transmitted a message and "RD" blinked, but the Q series C24 did not return a response message.	○		○	Section 10.3.3
	• An external device transmitted a message and "RD" blinked, but the Q series C24 did not turn ON the read request.		○	○	Section 10.3.4
	• ERR. LED turns on.	○	○	○	Section 10.3.20
Communication errors occurred (check according to Section 10.1.1)	• The "NAK" was turned ON.	○			Section 10.3.5
	• The "C/N" was turned ON.	○	○	○	Section 10.3.6
	• The "P/S" was turned ON.	○	○	○	Section 10.3.7
	• The "PRO" was turned ON.	○			Section 10.3.8
	• The "SIO" was turned ON.	○	○	○	Section 10.3.9
	• The "CH1. ERR. " or "CH2. ERR. " was turned ON.	○	○	○	Section 10.3.10
	• Communications are intermittently established and lost.	○	○	○	Section 10.3.11
	• Data that cannot be decoded was transmitted and received.	○	○	○	Section 10.3.12
	• Whether the cause of the communications error is in the Q series C24 or the external device is unknown.	○	○	○	Section 10.3.13
Cannot communicate via modem (*1)	• Cannot communicate via modem.	○	○	○	Section 10.3.14
	• Cannot communicate with ISDN sub-address.	○	○		Section 10.3.15
The PLC CPU monitoring function does not operate in the designated cycle time.	• Does not operate in the cycle time designated in the constant cycle transmission setting.	○	○		Section 10.3.16
	• Does not operate in the cycle time designated in condition agreement transmission setting.	○	○		Section 10.3.17
Cannot receive by an interrupt program	• Cannot receive data.		○	○	Section 10.3.17
Cannot perform initial setting	• Cannot write setting value in flash ROM of the Q series C24.	○	○	○	Section 10.3.19

*1 If an error occurs while performing data exchange using the modem function described in User's Manual (Application) Chapter 3, first check the following items and confirm whether or not the error is caused by the modem/TA connection.
If an error relating to the modem function is occurring, perform necessary corrective actions for each cause according to the reference sections given below:

- Check the ON/OFF status of current I/O signals of the Q series C24.
- Check the storage status for error codes related to the modem function. (See Sections 10.2.3.)
- Check the ON/OFF status of the DR terminal of the modem/TA. (See the manual for the modem/TA.)

REMARK

The following are precautionary notes when exchanging data with an external device via one of the Q series C24 interfaces.

(1) When the power supply to the Q series C24 or external device is started, the remote device that is connected may generate a reception error.

(2) If the remote device that is connected starts up while data is being transmitted, the remote device side will generate a reception error.

(3) When the Q series C24 error LED lights up because a reception error has occurred, turn off the light if necessary in accordance with Section 10.1.
Also, if a reception error has occurred on the external device side, handle the error by seeing to the operating manual for the external device.

* Handle the occurrence of a reception error on the Q series C24 side using the following corrective actions.
  - When communicating with the MC protocol
    The Q series C24 will disregard the received data or returns a response message indicating an abnormal termination if it detects a reception error after receiving the head data of the command message in the set format.
    If the reception error is detected before the head data of the command message in the set format is received, the received data will be disregarded.
  - When communicating using non procedure protocol
    If the Q series C24 detects a reception error, the reception abnormal detection signal (X4, XB) turns ON.
    Perform procedures such as detection of reception error or clearing received data as required by following the explanations found in Sections 6.1.4 and 6.1.5.
  - When communicating using bidirectional protocol
    When the Q series C24 detects a reception error after the head data of a communication message for bidirectional protocol is received, it returns a response message indicating an abnormal termination.
    If the reception error is detected before the head data of the communication message for bidirectional protocol is received, the received data will be disregarded.

10.3.1 Troubleshooting when "RUN" LED is turned OFF

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• The Q series C24 "RUN" LED turned off.	• A transmission setting switch is set to an unusable position.	• Set the switch by GX Developer correctly and after writing to the CPU reset the CPU.	○	○	○
	• PLC CPU error.	• Remove the cause of the CPU error and reset the CPU. Note • During the Q series C24 and external device loopback test, the minimum parameters file must be written to the CPU beforehand.	○	○	○
	• Power module 5 V current capacity is insufficient.	• Calculate the 5 V current drain of each installed module. If the current capacity is insufficient, check power module selection. Note • Whether or not the current capacity is insufficient can be checked by disconnecting the expansion base and installing only the Q series C24 to the basic base.	○	○	○
	• Extraneous noise caused the Q series C24 to abnormal operation.	• Check if the shield wire is 2-point ground. • When ground is used with other devices, ground the Q series C24 independently.	○	○	○

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10.3.2 Troubleshooting when "RD" LED does not blink even though an external device is transmitting a message

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• "RD" does not blink even through an external device is transmitting a message.	• Signal lines are not connected correctly.	• Check if the Q series C24 and external RD and SD signal lines are cross connected. • Use the external device OPEN statement to check if the opened port and the cable connection port are matched.	○	○	○
	• External device transmission control signals are not turned ON.	• Connect the wiring so that the "DSR", "CS", and other transmission control signals are ready. Note • Since the control signal specifications depend on the device, connect the wiring by seeing the instruction manual of the device used.	○	○	○
	• If the message passes through an RS-232 ↔ RS-422 converter, modem, etc., the signal is interrupted at one of the intervening devices.	• Check the specifications of the converter and modem and recheck the settings and wiring	○	○	○

10.3.3 Troubleshooting when the Q series C24 does not return a response message even though an external device transmitted a message and the "RD" LED blinked

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• An external device transmitted a message and "RD" blinked, but the Q series C24 did not return a response message. ("NEU" remains on and "SD" does not blink)	• Communication protocol is set incorrectly.	• Check if the communication protocol is set correctly. • Check if the mode was switched without using the buffer memory mode switching area. Note • The communication protocol setting contents and the communication protocol in the current operation can be checked at buffer memory addresses 250H to (CH1) and 260H (CH2).	○		
	• When "Check CD terminal" was set, the CD terminal was turned OFF.	• Since the message is initialized (skipped reading) when the CD terminal is turned OFF when "Check CD terminal" is set, change the wiring so that the CD terminal remains on all the time.	○		○
	• The header byte of the message is not data needed by the set protocol and format.	• Check if the external device sent a message matched to the protocol and format. Note • The Q series C24 skips all the messages transmitted until the header byte set for each protocol and format (for example, "ENQ (05H)" for format 1) is received.	○		○
	• The Q series C24 station No. switch setting and message station No. designation do not match.	• Check the Q series C24 station No. setting and message station No. designation. Note • When the station No. designation is local station after the header byte set for each protocol and format is received, the Q series C24 performs receive processing.	○		
	• The Q series C24 data communications monitoring time is set to "infinite", or the monitoring time is too long.	• Set, or shorten, the monitoring time and retransmit the message from the external device and determine the trouble from the contents of the time-out error. Note • Error detection by watchdog timers (timer 0 to timer 2) is possible in the following cases. • When part of a message is skipped. • When transmission from an external device is interrupted. • When a link error was generated while accessing another station over a MELSECNET/H, MELSECNET/10. See Chapter 6 of User's Manual (Application) for a detailed description of the monitoring time.	○		○
	• The path setting of the PLC CPU to be accessed is incorrect.	Check the path of the PLC CPU to be accessed and set the path again.	○		

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10.3.4 Troubleshooting when an external device transmitted a message and "RD" LED blinked, but the Read Request signal was not turned ON

Symptom	Cause	Corrective action	MC	Bidirectiona	Non procedure
• An external device transmitted a message and "RD" blinked, but the read request signal (X0) was not turned ON.	• Communication protocol is set incorrect.	• Check if the communication protocol is set correctly. • Check if the mode was switched without using the buffer memory mode switching area. Note • The communication protocol setting contents and the communication protocol in the current operation can be checked at buffer memory addresses 250H to (CH1) and 260H (CH2).		○	○
	• When "Check CD terminal" was set, the CD terminal was turned off.	• Since messages are skipped when the CD terminal is turned OFF when "Check CD terminal" is set, change the wiring so that the CD terminal remains on all the time.		○	○
	• When DC control is selected, the necessary DC codes are not transmitted.	• Check if a message is transmitted without transmitting "DC1 (11H)" after the external device transmits "DC3 (13H)" during DC1/DC3 external control. • Check if the next message is transmitted without adding "DC2 (12H)" after the external device transmits "DC4 (14H)" during DC2/DC4 external control.		○	○
	• The end code was not received, or fixed length data was not received.	• Check if the end code set at the Q series C24 and the end code transmitted from the external device are the same. • Check if the external device transmitted the fixed length designated at the Q series C24. • Check if the trailer frame was transmitted during communications by user frame. Note • When the send data from the external device is correct, take the corrective action described in Sections 10.3.10 and 10.3.11.		○	○
	• The Q series C24 setting and message format do not match.	• The data count basics, message format, etc. depend on the following settings. · ASCII-BIN conversion enable/disable · Transparent code setting · User frame setting See the relevant section for a description of operation according to the set contents and setting of each item.		○	○
	• The Q series C24 data communications monitoring time is set to "infinite", or the monitoring time is too long.	• Set, or shorten, the monitoring time and retransmit the message from the external device and determine the trouble from the contents of the time-out error. Note • Error detection by the watchdog timer (timer 0 to timer 2) is possible in the following cases. · When part of a message is skipped. · When transmission from an external device is interrupted. See Chapter 6 of User's Manual (Application) for a detailed description of the monitoring time.		○	○

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10.3.5 Troubleshooting when communication error "NAK" generates

<table>
<tr><th>Symptom</th><th>Cause</th><th>Corrective action</th><th>MC</th><th>Bidirectional</th><th>Non procedure</th></tr>
<tr><td rowspan="2">• Communication error signal "NAK" turned on.</td><td>• See section that describes the communication error signal ("C/N", "P/S", "PRO", "SIO") that are turned on simultaneously when the "NAK" signal is turned on.</td><td>• Take corrective action corresponding to the contents of the error.</td><td>○</td><td></td><td></td></tr>
<tr><td colspan="5">Note
Since the error code is added to "NAK" and is transmitted from the Q series C24 to the external device when the "NAK" signal is turned on, take the corrective action described in the error code table (see Section 10.2).
Since the error code added when "NAK" is transmitted is stored to the Q series C24 buffer memory shown below, it can also be checked at the Q series C24.
<table>
<tr><th colspan="2">Error code storage buffer memory address</th></tr>
<tr><td>CH1 side</td><td>25A_H</td></tr>
<tr><td>CH2 side</td><td>26A_H</td></tr>
</table></td></tr>
</table>

10.3.6 Troubleshooting when communication error "C/N" generates

<table>
<tr><th>Symptom</th><th>Cause</th><th>Corrective action</th><th>MC</th><th>Bidirectional</th><th>Non procedure</th></tr>
<tr><td rowspan="3">• Communication error signal "C/N" turned on.</td><td>• The Q series C24 cannot be installed in the CPU.</td><td>• Change to a CPU to which the Q series C24 can be installed.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• PLC No. designated local station (FF), or a station other than a station No. set with the network parameters.</td><td>• Change the PLC No. to local station (FF), or a station No. set with the network parameter and restart data communications.</td><td>○</td><td></td><td></td></tr>
<tr><td>• Routing parameters between CPU with the Q series C24 loaded and communications destination CPU are not set.</td><td>• Check the routing parameters and set them up to the communications destination CPU.</td><td>○</td><td></td><td></td></tr>
</table>

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Communication error signal "C/N" turned on.	• An error was generated on the MELSECNET/ H, MELSECNET/10.	• Check the error contents from the state of SB and SW related to the MELSECNET/H, MELSECNET/10 with the GX Developer monitor, etc. and perform the checks and take the corrective action described in the MELSECNET/H, MELSECNET/10 reference manual.	○		
	• The local station CPU on the MELSECNET/H, MELSECNET/10 generated an error.				
	• Module installation address designation during communications with intelligent function module is incorrect.	• Change the transmit message designation data.	○	○	○
	• A command that cannot be transmitted during RUN (sequence program, parameters, etc.) was transmitted, or "Disable write during RUN" is set.	• Stop the CPU and restart data communications.	○		
		• Set the "Enable/disable write during RUN" switch to "Enable" by command.	○		

10.3.7 Troubleshooting when communication error "P/S" generates

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Communication error signal "P/S" turned on.	• Data does not match the parity bit setting.	• Check the Q series C24 and external device data format and match the settings.	○	○	○
	• Sum check codes do not match.	• Check if the sum check code transmitted from the external device is correct. (Recalculate)	○		
	• When CH1 and CH2 are used in the linked mode, the cable is not connected to one of the interface.	• When using CH1 and CH2 independently, check that the Q series C24 is not in the linked mode. • When using CH1 and CH2 in the linked mode, also connect the cable to both of the interfaces. Note • If the cable is not connected to one of the interfaces when CH1 and CH2 are used in the linked mode, noise may enter and the data may be destroyed and "Data cannot be decoded" or "Communications error cause" may occur.	○	○	○

10.3.8 Troubleshooting when communication error "PRO." generates

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Communication error signal "PRO" turned on.	• Communications were performed with a control procedure different from the Q series C24 communication protocol setting. • Some of the data are different from the control procedure. • Designated command does not exist. • The device No. designation is not the character count corresponding to the command.	• Check the Q series C24 communication protocol setting and the message from the external device and match the settings, or correct the message and restart data communications.	○		
	• The characters in the message include a data other than the "A to Z", "0 to 9", "␣", and control data.	• Check and correct the external device message and restart data communications. Note • Only the data "0 to 9" and "A to F" can be handled as character area data during communications using an MC protocol (ASCII mode). Therefore, when transmitting a character string as data, convert the ASCII code of each character string to 2-byte binary code. Examples) • Transmitting the character "G" The ASCII code for the character "G" is 47_H and is transmitted as the two bytes 34_H, 37_H. • Transmitting the character "A" The ASCII code for "A" is 41_H and is transmitted as the two bytes 34_H, 31_H. If the ASCII code 41_H for the character "A" is transmitted unchanged, the Q series C24 ASCII-BIN conversion will convert it to A_H (10) and pass it to the PLC CPU.	○		
	• A device No. outside the designated range was designated.	• When designating a device, check "Device setting" of the parameters written to the CPU and correct it to a device No. within the designated range and restart data communications.	○		
	• A remote RUN/STOP request was issued while remote STOP was applied from another module.	• Check if remote STOP is applied from another module and restart data communications.	○		

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10.3.9 Troubleshooting when communication error "SIO" generates

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Communication error signal "SIO" turned on.	• Data does not match the stop bit setting.	• Check if the Q series C24 and external device settings are the same.	○	○	○
	• Transmission rate is too fast and the next data is transmitted before the Q series C24 completes processing of the receive data.	• Decrease the transmission rate and restart data communications.	○	○	○
	• Data larger than the receive buffer size was received.	• Use DTR and DC control and interrupt transmission before the buffer becomes full. Perform RS and CS control when the modem function is used. • Increase the transmission interval and provide an ample PLC CPU read processing time. Note • The non procedure protocol stores the data received up to first the end code received, or fixed length data, to the non procedure receive buffer memory and turns on the Read Request signal to the PLC CPU. If the next data is sent while the Read Request signal is ON, the data is temporarily stored to the OS receive buffer. When the OS receive buffer becomes full, the Q series C24 skips the rest of the data and turns on the "SIO" LED.		○	○
	• With a multidrop link, two or more devices transmitted data at the same time.	• Connect the external devices and the Q series C24 in a 1:1 configuration and perform a communications test. Since data is transmitted simultaneously from two or more devices with a multidrop link when normal communications among all the devices is possible, interlock the devices so that cannot transmit simultaneously.	○	○	○

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10.3.10 Troubleshooting when communication error "CH1 ERR.", "CH2 ERR." generate

<table>
<tr><th>Symptom</th><th>Cause</th><th>Corrective action</th><th>MC</th><th>Bidirectional</th><th>Non procedure</th></tr>
<tr><td rowspan="6">• "ERR." LED turned on.</td><td>• There is an error in the communication protocol or transmission setting.</td><td>• Read the error code from the buffer memory and check the error contents and change the switch setting to the correct setting.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• There is an error in the on-line mode switching designation.</td><td>• Read the error code from the buffer memory and check the error contents and correct the designation contents.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• On-demand execution generated an error.</td><td>• Read the error code from the buffer memory and check the error contents and correct the designation contents.</td><td>○</td><td></td><td></td></tr>
<tr><td>• The Q series C24 detected an error while transmitting data.</td><td>• Read the error code from the buffer memory and take the corrective action corresponding to the error contents.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• The Q series C24 detected an error while receiving data.</td><td>• Read the error code from the buffer memory and take the corrective action corresponding to the error contents.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="5">Note
• When the "ERR." LED is turned on, the error code is stored to the following buffer memory.
<table>
<tr><th rowspan="2">Error cause</th><th colspan="3">Error code storage buffer memory</th></tr>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td>Switch setting error</td><td colspan="2" rowspan="2">203H</td><td rowspan="2">Switch setting error, mode switching error storage area</td></tr>
<tr><td>Mode switching error</td></tr>
<tr><td>On-demand execution error</td><td>256H</td><td>266H</td><td>On-demand execution result storage area</td></tr>
<tr><td>Data transmission error</td><td>257H</td><td>267H</td><td>Data transmission result storage area</td></tr>
<tr><td>Data receive error</td><td>258H</td><td>268H</td><td>Data receive result storage area</td></tr>
<tr><td>Modern function error</td><td colspan="2">221H</td><td>Modern function error code storage area</td></tr>
<tr><td>MC protocol transmission error</td><td>025AH</td><td>026AH</td><td>MC protocol transmission error code</td></tr>
<tr><td>Monitoring device error</td><td>2205H</td><td>2305H</td><td>PLC CPU monitoring function execution result</td></tr>
</table>
∗ See Section 10.2 for a detailed description of the error codes.</td></tr>
</table>

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10.3.11 Troubleshooting when communications is intermittently established and lost

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Communications are intermittently established and lost. (*1)	• With a multidrop link, two or more devices transmitted data at the same time.	• Connect the external devices and the Q series C24 in a 1:1 configuration and perform a communications test. Since data is transmitted simultaneously from two or more devices with a multidrop link when normal communications among all the devices is possible, interlock the external devices so that they do not transmit simultaneously.	○	○	○
	• The signal cable wiring connection is faulty.	• Replace the cable, or make the connections firm.	○	○	○
	• When "Check CD terminal" is set, the CD signal is turned on/off repeatedly.	• Change the wiring so that the CD signal remains ON all the time, or change the setting to "Do not check CD terminal".	○	○	○
	• When half-duplex communications is selected, the ON/OFF timing of each signal is not matched.	• Control the external device so that the ON/OFF timing of each signal is matched. See Chapter 8 of User's Manual (Application).		○	○
	• Requested processing of the next transmission before the processing of the current transmission is completed. • Requested processing of the next reception before the processing of the current reception is completed.	• Make sure to obtain handshake in the sequence program.	○	○	○

*1 The following explains how to take corrective actions when a normal exit response message cannot be received upon sending of a command message.

1) When a response message of abnormal end is received
When an external device sent a command message and received an abnormal end response message, take corrective action with the error according to the error code in the response message (see Section 10.2).

2) When response messages cannot be received
Change the setting value for the response monitoring time (timer 1, default value is 5 seconds).
(See Section 6.2 of the User's Manual (Application).)
If response messages still cannot be received after changing the setting value, check the communication protocol setting of the corresponding interface, the ON status of the displayed LED, and the connection cable.

3) When the first part of a response message cannot be received
Increase the setting value of the message wait time (the default value is 0 ms).
(See Section 6.4 of the User's Manual (Application).)
If response messages still cannot be received after increasing the setting value, it is necessary to reduce the processing time from the end of transmission processing to the start of reception processing on the external device side.

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10.3.12 Troubleshooting when data that cannot be decoded is transmitted and received

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Data that cannot be decoded was transmitted and received	• With a multidrop link, two or more devices transmitted data at the same time.	• Connect the external devices and the Q series C24 in a 1:1 configuration and perform a communications test. Since data is transmitted simultaneously from two or more devices with a multidrop link when normal data communications among all the devices is possible, interlock the external devices so that they do not transmit simultaneously.	○	○	○
	• Data does not match the parity bit setting.	• Match the Q series C24 and external device parity bit settings. Note • If the setting of one side is data bit length 7 bits and with parity and the setting of the other side is data length 8 bits and without parity, the number of transmission/receive bits will be the same and the data will sent and receive without generating an error.	○	○	○
	• Data does not match the parity bit setting.		○	○	○
	• Transmission rate settings do not match.	• Match the Q series C24 and external device transmission rates.	○	○	○
	• With a multidrop link, the terminal resistor is not connected correctly.	• Check if the terminal resistor (110Ω or 330Ω in case of the Q series C24) is connected to the stations at both ends of the link.	○	○	○
	• When CH1 and CH2 are used to the linked mode, there is an interface without cable connection.	• When using CH1 and CH2 independently, check that the Q series C24 is not in the linked mode. • When using CH1 and CH2 in the linked mode, also connect the cable to both of the interfaces. Note • If the cable is not connected to one of the interfaces when CH1 and CH2 are used in the linked mode, noise may enter and destroy the data and "Data cannot be decoded" or "Communication error cause" may occur.	○	○	○

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10.3.13 Troubleshooting when it is unclear whether the communication error cause is in the Q series C24 or an external device

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure
• Whether the communications error cause is in the Q series C24 or an external device is unclear.	—	• Test the Q series C24 as described below to check where the cause is. 1) Check the hardware. • The Q series C24 must be installed firmly. • The pins of the Q series C24 must not be bent or otherwise abnormal. 2) Test the Q series C24 alone. (See Section 4.7.) • ROM/RAM/switch test must not generate any errors. • Self loopback test must not generate any errors. 3) Check the state of the PLC CPU. • There must not be any errors that stop PLC CPU operation. Note • The following methods are available for testing if normal communications are possible with the Q series C24 alone. 1) With one the Q series C24, set CH1 and CH2 to the non procedure protocol and connect the wiring the same as for the self loopback test and transmit data from one channel and receive the transmitted data at the other channel. If the transmitted data and the received data are the same, transmit and receive processing is performed normally. 2) When two Q series C24 are available, set one Q series C24 to the non procedure protocol and the other Q series C24 to a dedicated protocol and transmit an MC protocol message from the non procedure protocol station. If the MC protocol station returns the transmit message normally, transmit and receive processing is normal.	○	○	○

10.3.14 Troubleshooting when data cannot be communicated via modem

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• Auto modem initialization cannot be executed.	• A modem initialization error occurs.	• Check the error code and execute processing accordingly.	○	○	○
	• Modem connection channel designation is not performed.	• Set Modem connection channel designation.	○	○	○
	• There is an error in the switch settings in the GX Developer.	• Review the switch settings. Set it to match the local station modem and the TA.	○	○	○
• Data cannot be communicated with GX Developer supporting the Q series C24.	• Communication protocol setting is incorrect.	• Set the communication protocol to MC protocol, format 5.	○		
	• Transmission setting does not match the external device.	• Review the transmission setting.	○		
	• Communication rate does not match the external device.	• Review the communication rate setting.	○		
• The GX Developer does not receive the callback signals from the Q Series C24.	• The product is not supported by the GX Developer.	• Confirm the GX Developer's S/W version.	○		
	• There was an error in the GX Developer connection system.	• Check the GX Developer's connection system. • Set the connection system on "callback reception waiting" and connect.	○		
	• There is an error in the GX Developer side's modem settings.	• Set the modem's settings on "Auto Reception."	○		
• Callback connections from the GX Developer are refused by the Q Series C24.	• There s an error in the GX Developer's connection system.	• Check the GX Developer's connection system. • Correct the Q Series C24's settings.	○		
	• There is an error in the connection system's telephone No.	• Check the telephone No. • Change the telephone No. to the data for callback.	○		
• When performing Auto (callback: during fixed/ during designated number) from the GX Developer, connection to the Q Series C24 is refused.	• There is an error in the Q Series C24 setting value.	• Set the callback function designation on the setting 1 to 3.	○		
	• There is an error in the GX Developer's connection system.	• Check the GX Developer's connection system. • Check the Q Series C24's settings.	○		
	• There is an error in the telephone No. of the connection system.	• Check the telephone No. • Change the telephone No. to the data for callback.	○		
• It is possible to connect from the GX Developer, but callback from the Q Series C24 cannot be performed.	• The timer value for the status of the modem used or the line is short.	• Adjust each of the timer values for the callback function on the GX Developer side. (Line callback cancel wait time, callback delay time)	○		
	• There is a problem with the modem specifications or settings.	• Check the modem's specifications and settings.	○		

10.3.15 Troubleshooting when data cannot be communicated with the ISDN sub-address

Circumstance	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• Data cannot be communicated with ISDN sub-address	• Sub-address is incorrect.	• Review the sub-address.	○	○	
	• Modem does not support ISDN sub-address.	• Use modem that supports ISDN sub-address.	○	○	
	• Sub-address is incorrectly partitioned.	• Review how to partition the sub-address using the TA manual.	○	○	

10.3.16 Troubleshooting when constant cycle transmission does not operate normally

Circumstance	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• Does not operate in the cycle time designated in the constant cycle transmission setting	• The setting value of the constant cycle transmission is incorrect.	• Review the constant cycle transmission setting.	○	○	
	• The cycle time is affected by some causes.	• Remove the causes or designate the cycle time anticipating the causes.	○	○	

10.3.17 Troubleshooting when condition agreement transmission does not operate normally

Circumstance	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• Does not operate in the cycle time designated in condition agreement transmission setting	• The setting value of the condition agreement transmission is incorrect.	• Review the condition agreement transmission setting.	○	○	
	• The cycle time is affected by some causes.	• Remove the causes or designate the cycle time anticipating the causes.	○	○	

10.3.18 Troubleshooting when data cannot be received by an interrupt program

Circumstance	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• Cannot receive data with the interrupt program	• Interrupt issuance was not designated.	• Designate interrupt issuance.		○	○
	• Receiving by instruction other than BUFRCVS.	• Use BUFRCVS instruction to receive interrupt data.		○	○
	• "Parameter setting" - "PC system setting" - or "Interrupt pointer setting" are not set on the PLC CPU side, or the settings are incorrect.	• Review "Parameter setting" - "PS system setting" - "Interrupt pointer setting" on the PLC CPU side		○	○

10.3.19 Troubleshooting when data cannot be written to Flash ROM

Circumstance	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• Cannot write data to Flash ROM	• Flash ROM overwrite allow/prohibit was not set to allow.	• Set Flash ROM overwrite allow/prohibit to allow.	○	○	○
	• Setting change was not set to allow in the switch settings by GX Developer.	• Set setting change to allow in the switch setting by GX Developer.	○	○	○

10.3.20 Troubleshooting when the "ERR" LED is lit

Circumstance	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol
• "ERR" LED is lit	• A communication error has occurred.	• Check the error and remove the cause according to Section 10.1.1.	○	○	○
	• Switch settings of the Q series C24 are incorrect.	• Review the switch settings of the Q series C24.	○	○	○

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APPENDIX

Appendix 1 Functional Improvements of the Q Series C24

The Q series C24 of function version B has several functions that have been added or changed from the conventional product (function version A).
This chapter explains a comparison of the functions of Q series C24/GX Configurator-SC accompanied by the change/addition of functions, and explains how to utilize programs created for function version A as well as how to incorporate function version B modules into the existing system.

Appendix 1.1 Comparison of the Functions of Q Series C24/GX Configurator-SC

(1) Comparison of the functions of Q series C24

The following table shows the functions of Q series C24.

Function				Q series C24 (function version)		
				QJ71C24N (-R2/R4)	QJ71C24 (-R2)	
				B	B	A
Communication using the MC protocol				○	○	○
	Communication with ASCII code	Communication with QnA compatible 2C/3C/4C frame	Formats 1 to 4 exist for each.	○	○	○
		Communication with A compatible 1C frame		○	○	○
	Communication with binary code	Communication with QnA compatible 4C frame	Format 5	○	○	○
	Read/write of device memory	Batch read/write in bit/word units		○	○	○
		Monitoring of device memory		○	○	○
		Batch read/write of multiple blocks		○	○	○
		Read/write by extension designation		○	○	○
		Accessing other stations via network system		○	○	○
	Reading/writing from/to the buffer memory of the Q series C24			○	○	○
	Reading/writing from/to the buffer memory of intelligent function modules			○	○	○
	Reading/writing from/to sequence program files			○	○	○
	Monitoring the PLC CPUs (PLC CPU monitoring function)			○	○	○
		Transmission of the monitoring information using the modem function.		○	○	×
	Status control of the PLC CPUs (remote RUN/STOP, etc.)			○	○	○
	Turning on/off input signals of the Q series C24 from an external device (global function)			○	○	○
	Data transmission from a PLC CPU to an external device (on-demand function)			○	○	○
Communication using non-procedure protocol				○	○	○
	Data transmission/reception in any format			○	○	○
	Data transmission/reception using user frames			○	○	○
		Data reception using format-0 (*2)		○	○	○
		Data reception using format-1		○	○	×
	Data reception by interrupt programs			○	○	○
	Monitoring the PLC CPUs (PLC CPU monitoring function)			○	○	○
		Transmission of the monitoring information using the modem function.		○	○	×
	ASCII data transmission/reception by ASCII-BIN conversion			○	○	○
	Data transmission/reception by specifying transparent code			○	○	○
		Specification of Receive transparent code		○	○	○
		Specification of Transmission transparent 1st (*3)		○	○	○
		Multiple specification of Transmission transparent 2nd to 10th		○	○	×
	Reception data clear by dedicated instruction (CSET instruction)			○	○	×

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Function				Q series C24 (function version)		
				QJ71C24N (-R2/R4)	QJ71C24 (-R2)	
				B	B	A
Communication using bidirectional protocol				○	○	○
	Data transmission/reception in any format			○	○	○
	Data reception by interrupt programs			○	○	○
	ASCII data transmission/reception by ASCII-BIN conversion			○	○	○
	Data transmission/reception by specifying transparent code			○	○	○
		Specification of Receive transparent code		○	○	○
		Specification of Transmission transparent 1st (＊3)		○	○	○
		Multiple specification of Transmission transparent 2nd to 10th		○	○	×
Registration of user frame for data communication				○	○	○
	Registration of changeable data (added 05_H, $0B_H$, 11_H, and 17_H)			○	○	×
	Registration of changeable data (added 04_H and $0A_H$)			○	×	×
	Registration of changeable data (added $E5_H$ and EB_H)			△ (＊1)	×	×
Communication via public network, etc. (modem function)				○	○	○
	Automatic initialization of modem			○	△ (＊1)	×
	Remote password check			○	○	×
	Callback (＊4)			○	△ (＊1)	×
Transmission control		DC code control (including Xon/Xoff control)		○	○	○
		DTR/DSR (ER/DR) control		○	○	○
Mode switching				○	○	○
	Switch to GX Developer connection mode			○	×	×
Independent/linked operation of each interface				○	○	○
Support for 230400 bps				○	×	×
Data transmission/reception at low speed (transmission speed: 50 bps)				○	○	×
Control of RS and DTR signal states				○	×	×
Data communication monitoring time				○	○	○
	Non procedure and non reception monitoring time format designation			○	×	×
Transmission control start/end free area designation				○	×	×
Communication data monitoring function				○	×	×
UINI instruction				△ (＊1)	×	×
Monitoring/testing of initial settings and setting values with utility package				○	○	○
	Startup from the system monitor (＊5)			○	○	○
	Addition to the setting items			(See (2))		—
GX Developer and GOT connection				○	○	○
	Simultaneous connection of GX Developer and GOT to the Q series C24 (＊6)			○	○	×
Support for multiple CPU system				○	○	×
	Communication with non-control CPU using the MC protocol			○	○	×
		Communication with QnA compatible 4C frame (ASCII code)	Formats 1 to 4	○	○	×
		Communication with QnA compatible 4C frame (binary code)	Format 5	○	○	×
	Multiple CPU setting using GX Developer (I/O assignment, switch setting, interrupt pointer setting, etc.)			○	○	×

○ : Usable
△ : Usable (Model serial no. [production date] limited)
× : Usable

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*1 There is a limitation in the production date of the Q series C24 that contains functions that are usable.
For version verification, see section 2.6.
*2 The data reception using format-0 refers to the method of receiving data by user frame, which was supported in the Q series C24 of function version A.
*3 The Q series C24 of function version A is capable of setting one pair of transparent code and additional code per interface for both transmission and reception.
*4 This function can be used when connecting with GX Developer.
*5 This function is available in GX Developer Version 6 or later.
*6 GX Developer can only be connected to the CH1 side in case of the Q series C24 of function version A.
It is not possible to connect both GX Developer and the GOT to the two interfaces at the same time.

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(2) List of added setting items for GX Configurator-SC

The following table lists the setting items added to the GX Configurator-SC due to a software version upgrade.

Screen (System setting/monitor)	Additional setting item	GX Configurator-SC Software version					Reference section
		Version 2.06G	Version 2.00A	Version 1.10L	SW0D5C-QSCU-E		
					40E, 30D, 20C	10B, 00A	
Modem function monitor/test	Accumulated count of unlock process normal completion	○	○	○	○	×	Section 8.4.4 Section 8.6.2
	Accumulated count of unlock process abnormal completion	○	○	○	○	×	
	Accumulated count of lock process based on circuit disconnect	○	○	○	○	×	
	Callback permit accumulated count	○	○	○	×	×	
	Callback denial accumulated count	○	○	○	×	×	
	Auto (callback) connection permit accumulated count	○	○	○	×	×	
	Auto (callback) connection denial accumulated count	○	○	○	×	×	
	Accumulated count of callback receive procedure cancel	○	○	○	×	×	
Modem function system setting	Circuit disconnect wait time (PLC CPU watch use)	○	○	○	○	×	
	Remote password mismatch notification count designation	○	○	○	○	×	
	Remote password mismatch notification accumulated count designation	○	○	○	○	×	
	Auto modem initialization designation	○	○	○	×	×	
	Callback function designation	○	○	○	×	×	
	Callback denial notification accumulated count designation	○	○	○	×	×	
	Data No. for callback designation 1 to 10	○	○	○	×	×	
Transmission control and other monitoring/tests	RS-232 control signal status CS (CTS)	○	○	×	×	×	Section 8.4.5 Section 8.6.3
Transmission control and other system settings	RTS (RS) designation	○	○	×	×	×	
	DTR (ER) designation	○	○	×	×	×	
	Transmission control start free area	○	○	×	×	×	
	Transmission control end free area	○	○	×	×	×	
	Send/Recv data monitoring designation	○	○	×	×	×	
	Action for buffer full	○	○	×	×	×	
	Stop by Timer 0 error	○	○	×	×	×	
	Monitor buffer head address	○	○	×	×	×	
	Monitor buffer size	○	○	×	×	×	
	Transmission transparent code designation (2nd to 10th)	○	○	○	○	×	
Non procedure system setting	User frame receive format designation (1st to 4th)	○	○	○	○	×	Section 8.4.7 Section 8.6.5
	Exclusive format-1 received data count (1st to 4th)	○	○	○	○	×	
Non procedure monitor/test	Timeout at No-protocol	○	○	×	×	×	
Monitor/test others	Station. No. (Instruction setting)	○	×	×	×	×	Section 8.6.9
	Communication error clear request for CH□ and to turn LED off	○	×	×	×	×	Section 8.6.9 Section 8.6.10
Auto refresh setting	Accumulated count of unlock process normal completion	○	○	○	○	×	Section 4.6
	Accumulated count of unlock process normal completion	○	○	○	○	×	
	Accumulated count of lock process based on circuit disconnect	○	○	○	○	×	

○ : Setting possible × : Setting impossible

POINT

(1) GX Configurator-SC SW0D5C-QSCU-E 20C or later supports the Q series C24 of function version B.

(2) See Section 2.6 of this manual for how to check the software version of GX Configurator-SC.

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Appendix 1.2 Precautions when Updating the Module from Function Version A to B

This section explains how to utilize programs created for the Q series C24 of function version A for the Q series C24 of function version B and how to incorporate function version B into the existing system.

(1) Program utilization

Programs created for the Q series C24 of function version A can be used as they are for the Q series C24 of function version B.

(2) Incorporation into the existing system

The wiring used for function version A can be used as is for the Q series C24 of function version B.

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Appendix 2 QnA/A Series Module

This section explains a comparison of the functions of the Q series C24 and QnA/A series modules, and explains how to utilize programs created for A series modules as well as how to install the Q series C24 into the existing system.
QnA/A modules refer to the following products.

Model name	Product name
QC24N	AJ71QC24N (-R2,R4), A1SJ71QC24N (-R2)
QC24	AJ71QC24 (-R2,R4), A1SJ71QC24 (-R2)
UC24, C24-S8	AJ71UC24, A1SJ71UC24 (-R2,R4,PRF), AJ71C24-S8

Appendix 2.1 Functional Comparison with the Q series C24 and the QnA/A Series Modules

The following shows a functional comparison between the Q series C24 and the QnA/A series modules.
The ○ symbol in the model name columns indicates that the corresponding functions are compatible between the applicable models (for more information, see the manual for each module).
Indicates functions that have been added to or modified from the QnA/A series modules.

Function			Q series C24	QC24N	QC24	UC24	C24-S8
Communication using MC protocol			—				
	Communication in QnA compatible 3C frame	Communication with ASCII code	○	○		×	×
	Communication in QnA compatible 4C frame		○	○			
	Communication in QnA compatible 2C frame		○	○	×	×	×
	Communication in A compatible 1C frame		○	○			
	Communication in QnA compatible 4C frame	Communication with binary code	○	○		×	×
	Read/write of QCPU device memory		—				
	Batch read/write of device memory (＊5) ＊ Excluding multiple block batch read/write.		○	○		○ (＊1)	○ (＊1)
	Multiple block batch read/write (＊5)		○ (＊2)	○ (＊2)	×	×	×
	Accessing other stations (via network/data link)		○ (＊3)	○		○	○
	Transmission from the PLC CPU (on-demand)	Arbitrary data	○	○		○	○
		Using user frame	○	○		×	×
	Communication with m:n connection between the PLC CPU and external devices		○	○			
Communication using non procedure protocol			—				
	Transmitted/received with arbitrary format		○	○			
	Transmitted/received with user frame		○	○		○ (＊4)	×
	Transmitted/received with ASCII-BIN conversion		○	○		×	×
	Transmitted/received with transparent code designation		○	○		×	×
Communication using bidirectional protocol			—				
	Transmitted/received with arbitrary format		○	○			
	Transmitted/received with ASCII-BIN conversion		○	○		×	×
	Transmitted/received with transparent code designation		○	○		×	×

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Function		Q series C24	QC24N	QC24	UC24	C24-S8
Accessing other stations with link dedicated instructions		×	○ (via QC24 (N))		×	×
Interrupt processing (at data reception)	Non procedure protocol	○	×	×	×	×
	Bidirectional protocol					
Communication via public lines using modem function		△	○	×	×	×
Communication using the PLC CPU monitoring function		○	×		×	×
Auto refresh directed to the PLC CPU		○	×		×	×
Transmission control	DC code control	○	○			
	DTR/DSR signal control	○	○			
Half-duplex communication control		○	○			
Mode switching		○	○			
Independent operation of two interfaces	Setting the same protocol	○	○		×	
	Setting different protocols	○	○			
Linked operation of two interfaces		○	○		○	
Registering initial setting values of the buffer memory		○ (Flash ROM)	○ (EEPROM)		×	×
Registering user frame					×	×
Connection forms with external devices	1:1, 1:n	○	○			
	m:n	○	○			
I/O signal transmission/receive by multi drop link function		×	×		○	×
Connection of GX Developer		○	○			
Communication data monitoring		△	×		×	×
Registering and monitoring of setting values by the utility package		○	×		×	×
PLC that can be mounted		QCPU MELSECNET/H remote I/O station	QnACPU MELSECNET/10, Remote I/O station		ACPU AnACPU AnUCPU QnACPU	ACPU AnACPU AnUCPU QnACPU
Data transmission rate (bps)		230400 maximum (＊6)	115200 maximum	19200 maximum	19200 maximum	19200 maximum

○: Function exists/possible
△: Function exists/possible (specification is different depends on the function version (see Appendix 1)
×: No function/impossible

＊1 Access is possible only within the range of an AnACPU device.

＊2 A multiple block batch read/write function can be used for the local station QCPU to which the Q series C24 is mounted and the next CPU module, which will be another station, via MELSECNET/H, MELSECNET/10.

Function	PLC CPU			
	QCPU	QnACPU	Q2AS(H)	Q4AR
Multiple block batch read/write	(All allowed)	(9707B or later products) ＊		(All allowed)

＊ This function is added to modules showing 9707B or later in the package indication and the DATE column of the rating plate.

＊3 Access to other stations cannot be performed via data link system (MELSECNET(II), MELSECNET/B).

＊4 Transmission is only possible using the printer function.

＊5 When the Q series C24 is used, it is possible to read/write a maximum of 960 words (in case of QC24(N), it is possible to read/write a maximum of 480 words.)

＊6 230400 bps can be used via CH1 of QJ71C24N (-R2/R4) only.
The maximum transmission speed of QJ71C24 (-R2) is 115200 bps.

Appendix 2.2 Using Programs Designed for the QC24 (N) and Installing the Q Series C24 into Existing Systems

This section explains how to use programs designed for serial communication modules in the QnA series and the installation of the Q series C24 into an existing system.

POINT

When using the Q series C24, make sure to set the operation mode, station number, and transmission specifications with the following parameter setting screen of GX Developer.

- "Intelligent function module switch setting" screen

The Q series C24 does not have the setting switches to set the operation mode, station number, and transmission specification that are available in the serial communication modules for QnA series.

Appendix 2.2.1 Using programs designed for the QC24 (N)

The data communication between the QnACPU and external devices as well as other QnACPU which has been performed by QC24(N) can also be performed by the Q series C24.
The following explains how to use programs designed for QC24(N) during data communication using the Q series C24.

(1) The communication programs directed to the QC24(N) on the external device side and the communication programs on the QnACPU (self-station) side to which the QC24(N) is mounted can be used for the Q series C24.
However, note the following points.
- There is no function that allows data communication with other station's PLC CPUs by a data link instruction.
Delete the part of data communication program by data link instructions.
- When using a new function, create a new program.

(2) Make sure to check operation when using communication programs for QC24(N) on the external device side and the QnACPU (self-station) side.

(3) The notes during data communication by RS-422/485 interface also apply to the Q series C24.
- Take measures against data error reception on the external device side (see Section 3.3.3).
- Operation of RS-422/485 interface on the PLC side.

Appendix 2.2.2 Installing on existing systems

The following explains the Installation of the Q series C24 on an existing system.

(1) Installing on a multidrop connection system

The Q series C24 can be installed on an existing system to which the PLC CPU and external devices are connected as 1:n or m:n multidrop connection (*1).

*1 This is when a QC24(N) or a computer link module (such as AJ71UC24) is used as the PLC CPU module of the multidrop connection.

However, there are frame restrictions when data communication is performed. (See the Reference Manual.)

(2) Replacing the QnACPU module with a QCPU

The wiring used by the QC24(N) can be used as is.

POINT
The functional use is the same, except for the functions added by the Q series C24 to the conventional module. However, with the introduction of high-speed QCPUs, there may be cases in which communication cannot be performed normally when a PLC module in the QnA series is replaced by a Q series PLC. When a module is changed to a Q series PLC module, make sure to perform an operation check.

Appendix 2.3 Using Programs Designed for the Computer Link Module and Installing the Q Series C24 into Existing Systems

This section describes how to use programs created for A series computer link modules and installing the Q series C24 into an existing system.

POINT

When using the Q series C24, make sure to set the operation mode, station number, and transmission specifications with the following parameter setting screen of GX Developer.

- "Intelligent function module switch setting" screen

The Q series C24 does not have the setting switches to set the operation mode, station number, and transmission specification that are available in the computer link module for A series.

Appendix 2.3.1 Using programs designed for the computer link module

The data communication between the PLC CPU and external device as well as other PLC CPU that has been performed by A series computer link modules (hereinafter abbreviated as UC24/C24-S8) can also be performed using the Q series C24. However, UC24/C24-S8 and the Q series C24 have major differences in the following points.
For PLC CPU side, create a new program according to the explanation in the section of the function used.
(Differences between UC24/C24-S8 and the Q series C24)

- Initial setting items and the setting method of addresses and special application areas of the buffer memory
- Input/output signals for handshake
- Dedicated instructions of the PLC CPU

(1) Initial settings for special application area in buffer memory

1) In the Q series C24 the addresses for special application areas in the buffer memory are different from those of UC24/C24-S8. The Q series C24 has more initial setting items.
   The setting method is different such that the settings are performed using the utility package (GX Configurator-SC).
2) Register necessary initial setting values according to Chapter 8.
3) The default value for the CD terminal check setting is changed to "No check".

(2) Data communication using the MC protocol (identical to the communication functions of the dedicated protocol of UC24/C24-S8)

(a) Communication protocol setting
   Data communication is performed using an A compatible 1C frame by setting the communication protocol setting of the Q series C24 specified by GX Developer to the same form as set in the mode setting switch of UC24/C24-S8.

(b) Command message and response message

1) The message format used in the data communication using the A compatible 1C frame is the same as the message format of UC24/C24-S8.
2) Check available commands and devices that can be accessed in Chapter 8 of the Reference Manual, and access the PLC CPU from the external device.
3) For the QCPU, only read/write of device memory is possible.
For the range of devices that can be accessed, see Section 5.2.1 of the Reference Manual.
* The devices added to the QCPU, i.e. the latch relay (L), step relay (S), and file register (R) devices, are accessed using commands for QnA compatible 2C/3C/4C frames. It is necessary to create new programs.

(c) Accessing other stations

1) When accessing other station's PLC CPU via the MELSECNET/10, "Valid module during other station access" must be designated in the parameter setting by GX Developer.
2) Check the stations that can be accessed in Chapter 5 of the Reference Manual, and access the PLC CPU from the external device.
3) When it is necessary to access other stations on other MELSECNET/10, data communication must be performed in a QnA compatible 3C/4C frame.
Create a new program for the external device side according to Chapter 3 of the Reference Manual.
4) It is not possible to access other stations via the MELSECNET(II)/B.

(d) Transmitting data to the external device by the on-demand function

1) The program for data transmission on the PLC CPU side is different from when UC24/C24-S8 is used.
Create a new program on the PLC CPU side according to Section 3.11 in the Reference Manual.
2) Data to be sent to the external device is identical to when the UC24/C24-S8 is used.

(3) Data communication using the non procedure protocol

(a) Data transmission/reception

1) The same data transmission/reception as used by UC24/C24-S8 can be performed.
2) Create a new program for data communication upon checking functions and instructions used on the PLC CPU side in Chapter 6 of this manual and Chapter 11 of the User's Manual (Application).
Data transmission/reception is performed using dedicated instructions.

3) When data is received by a reception end code, the external device side must send the end code data (the default is CR+LF (code: $0D_H$ and $0A_H$) at the end of the data sent to the PLC CPU side.
Once any end code is registered, data can be transmitted in the same way as for the UC24/C24-S8.
4) The external device side can receive data from the Q series C24 in the same ways as UC24.

(b) Message transmission by printer function (when using programs designed for UC24)

1) Message transmission using the printer function of the UC24 can be implemented by the data transmission function that uses a user frame.
2) For the PLC CPU, register and send messages according to the User's Manual (Application).
Messages handled by the UC24 will become user frames in the Q series C24.

(4) Data communication using the bidirectional protocol

(a) Setting to add a sum check code to a message
The setting to add a sum check code to a message has been changed. It is set during switch setting operation by GX Developer.

(b) Data transmission/reception

1) The same data transmission/reception as used by UC24/C24-S8 can be performed.
2) Create a new program for data communication upon checking functions and instructions used on the PLC CPU side in Chapter 7.
Data transmission/reception is performed using dedicated instructions.
3) The external device can transmission/receive data in the same way as the UC24/C24-S8.

(5) Others

1) The Q series C24 has other functions that are equivalent to those of UC24/C24-S8, which are not mentioned above.
2) Check functions and specifications in this manual and the manuals listed below, and use the applicable functions.
- User's Manual (Application)
- Reference Manual

Appendix 2.3.2 Installing the Q series C24 into existing systems

This section shows the notes when installing the Q series C24 into an existing system that uses UC24/C24-S8.

(1) Data communication using m:n connection

When the Q series C24 is installed into an existing system that has an m:n system structure between the PLC CPU and external devices, and data communication is performed using the MC protocol, the following notes should be considered:

(a) Accessing the PLC using a frame for form 5

When the UC24/C24-S8 is connected on the line, it is not possible to access the PLC in the QnA compatible 4C frame (form 5) for binary code communication.

(b) Data communication between external devices

1) When data communication is performed in order to link with an external devices to perform a 1:1 communication with the PLC CPU, it is necessary to change the station number (80_H to $A0_H \rightarrow 00_H$ to $1F_H$) designated in the "Station number" and "Local station number" items in the messages on the external device side. (It is not necessary to specify this when an A compatible 1C frame is used.)
Alternatively, it is necessary to change the message frame so that it has a data order different from that of the MC protocol.
   - Station number: Designate the number of device to which data is sent
   - Local station number: Designate the number of the device that sends data

2) Perform the data communication according to Chapter 14 of the User's Manual (Application).

(c) Processing reception data on the external device side

Set the external device so that it ignores the following reception messages that are unrelated to the local station.

- The command message and the corresponding response message that are sent from other stations when accessing the PLC CPU using the MC protocol.
- Messages when accessing between external devices.

(2) Data communication using 1:n connection

When the UC24/C24-S8 is connected on the line, it is not possible to access the PLC in the QnA compatible 4C frame (format 5) for binary code communication.

POINT
Since performances and response speeds are different between the Q series C24 and the UC24/C24-S8, communication may not be performed normally when a PLC module in the A series is replaced by a Q series PLC. When a module is changed to a Q series PLC module, make sure to check operation.

Appendix 3 Processing Time

(1) Time required to process communication using the non procedure protocol (guideline)

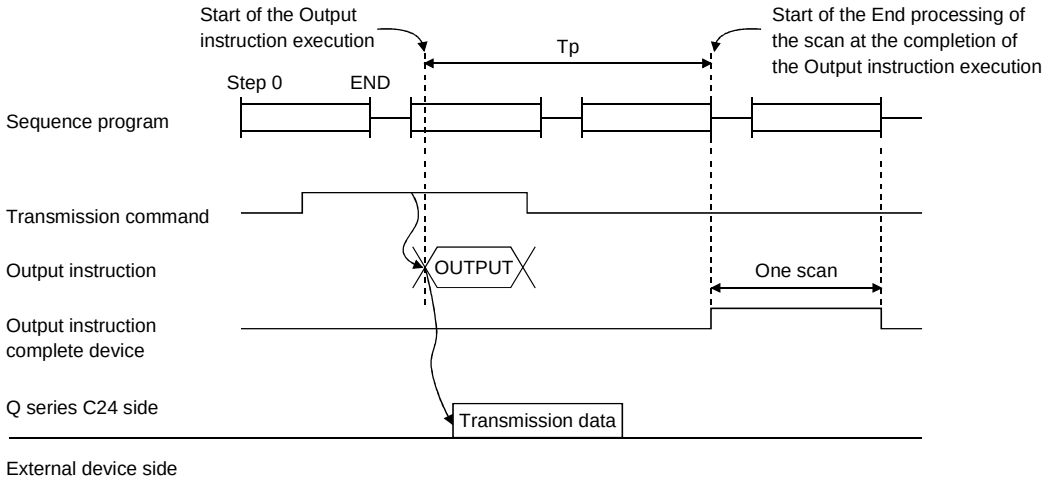
The processing time for the Output and Input instructions can be estimated by the following formula. Note, however, that the processing time may become longer depending on other communication functions (e.g., communication using the MC protocol) and special functions (e.g., ASCII-binary conversion, transmission control) that are used at the same time.
The value obtained from the following formula should be used as a guideline for the processing time when reception or transmission only is performed using only CH1 (RS-232 connection).

(a) Output instruction

$Tp = St + (D_{le}/Cr \times 1000 + 0.07) \times Ds + T1$

Tp (*1) : The time from the start of execution of the Output instruction to the End processing of the sequence scan at the completion of the Output instruction execution (ms)
St : Scan time
D_{le} : Data length of 1 byte at data transmission (number of bits)
Cr : Communication rate (bps)
Ds : Number of bytes of transmission data
T1 : QJ71C24N (-R2/R4) T1 = 3.0
QJ71C24 (-R2) T1 = 4.86

*1 This stands for the time range of processing (Tp).



[Calculation example]

Estimate the time required to process the Output instruction when transmitting 100 bytes of data using the non procedure protocol with the QJ71C24N. (Unit: ms)

- Scan time : 10 ms
- Data length : 10 bits (1 start bit, 8 data bits, 1 stop bit, no parity bit)
- Communication rate : 19200 bps

$10 + (10/19200 \times 1000 + 0.07) \times 100 + 3.0 \fallingdotseq 72.08$ (ms)

(b) Input instruction

Tp = Sr + 0.09 × Dr + T2

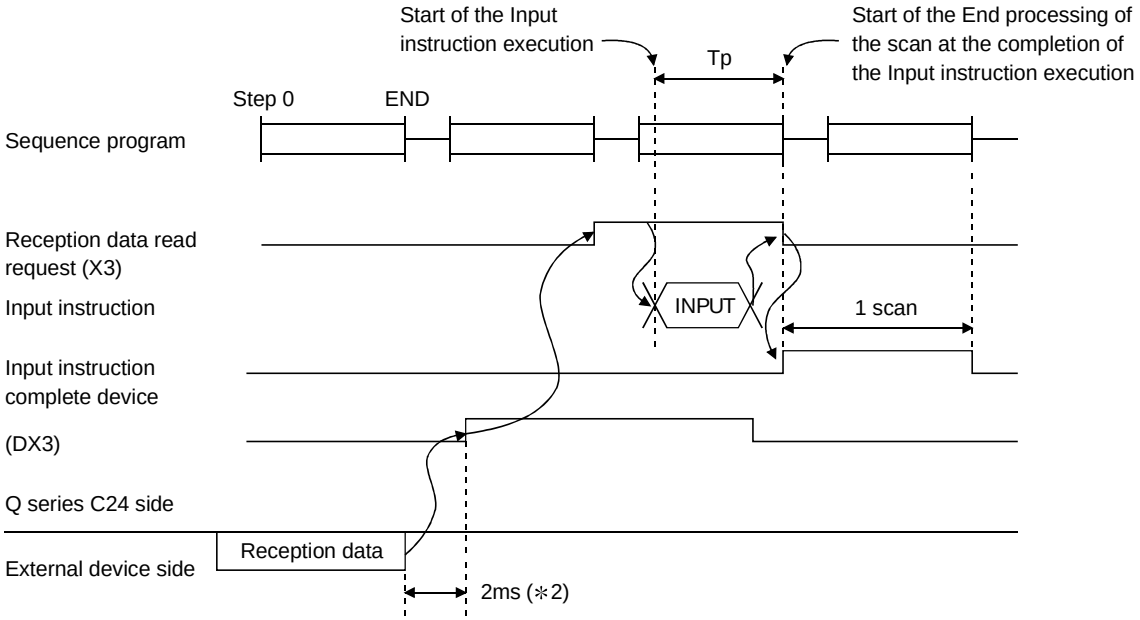
Tp (*1) : Time from the start of execution of the Input instruction to the End processing of the sequence scan at the completion of the Input instruction execution (ms)

Sr : Scan time

Dr : Number of bytes of reception data

T2 : QJ71C24N (-R2/R4) T2 = 7.0
QJ71C24 (-R2) T2 = 14.91

*1 This stands for the time range of processing (Tp).



[Calculation example]

Estimate the time required to process the Input instruction when receiving 100 bytes of data using the non procedure protocol with the QJ71C24N. (Unit: ms)

- Scan time : 10 ms

10 + 0.09 × 100 + 7.0 ≒ 26.00 (ms)

*2 When only using CH1 of the Q series C24 and when processing only 30 bytes of data received, the time until the reception data read request (X3) comes on is displayed after the Q series C24 receives data from the network.

2) Processing time of dedicated instructions
The following table shows the operation processing time (rough standard) of each dedicated instruction.
The operation processing time differs slightly depending on the system configuration and communication protocol.

Instruction name	Processing time (unit: ms)						Instruction execution condition		
	Q02H/Q06H/Q12H/ Q25H/Q12PH/Q25PH CPU		Q02CPU		Q00J/Q00/ Q01CPU		Transmission speed	Transmission/receive (registered) data count	Others
	QJ71C24N (-R2/R4)	QJ71C24 (-R2)	QJ71C24N (-R2/R4)	QJ71C24 (-R2)	QJ71C24N (-R2/R4)	QJ71C24 (-R2)			
ONDEMAND	48.0	51.5	48.6	52.2	49.7	53.6	19200 bps	40 bytes	Send in form 3
OUTPUT	23.4	24.8	23.8	25.3	25.6	26.7	Data size: 8	40 bytes	—
PRR	23.3	26.8	24.2	27.0	25.1	28.3	Stop bit: 1 Parity: none	40 bytes ✻ 8 bytes × 5 frames	—
INPUT	3.4	9.9	3.9	9.9	4.9	10.0	—	40 bytes	Execute instruction after 40 bytes have been received.
BIDOUT	28.6	47.0	30.5	47.1	32.6	49.6	—	40 bytes	—
BIDIN	26.4	29.1	27.6	29.9	29.8	31.7	—	40 bytes	—
PUTE	881.9	881.9	884.4	884.4	871.4	899.5	—	40 bytes	—
GETE	1.1	1.1	1.5	1.5	3.1	3.2	—	40 bytes	—
SPBUSY	0.1	0.1	0.2	0.2	0.3	0.3	—	—	—
CSET	1.0	1.2	1.6	1.7	3.4	3.9	—	—	Transmission/ receipt buffer setting
BUFRCVS	0.3	0.3	0.5	0.5	—	—	19200 bps	40 bytes	—

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Appendix 4 ASCII-Code Table

The ASCII-code table is shown below. (7-bit code)
The codes 00H to 1FH indicated by the ★ are used as Q series C24 control codes. (DC codes 11H to 14H can be changed by the user.)

LSD \ MSD		0	1	2	3	4	5	6	7
		000	001	010	011	100	101	110	111
0	0000	NUL★	DLE★	SP	0	@	P	,	p
1	0001	SOH	DC1★	!	1	A	Q	a	q
2	0010	STX★	DC2★	"	2	B	R	b	r
3	0011	ETX★	DC3★	#	3	C	S	c	s
4	0100	EOT★	DC4★	$	4	D	T	d	t
5	0101	ENQ★	NAK★	%	5	E	U	e	u
6	0110	ACK★	SYN	&	6	F	V	f	v
7	0111	BEL	ETB	/	7	G	W	g	w
8	1000	BS	CAN	(	8	H	X	h	x
9	1001	HT	EM	)	9	I	Y	i	y
A	1010	LF★	SUB	*	:	J	Z	j	z
B	1011	VT	ESC	+	;	K	[	k	{
C	1100	FF★	FS	,	<	L	\	l	|
D	1101	CR★	GS	—	=	M	]	m	}
E	1110	SO	RS	.	>	N	↑	n	~
F	1111	SI	US	/	?	O	←	o	DEL

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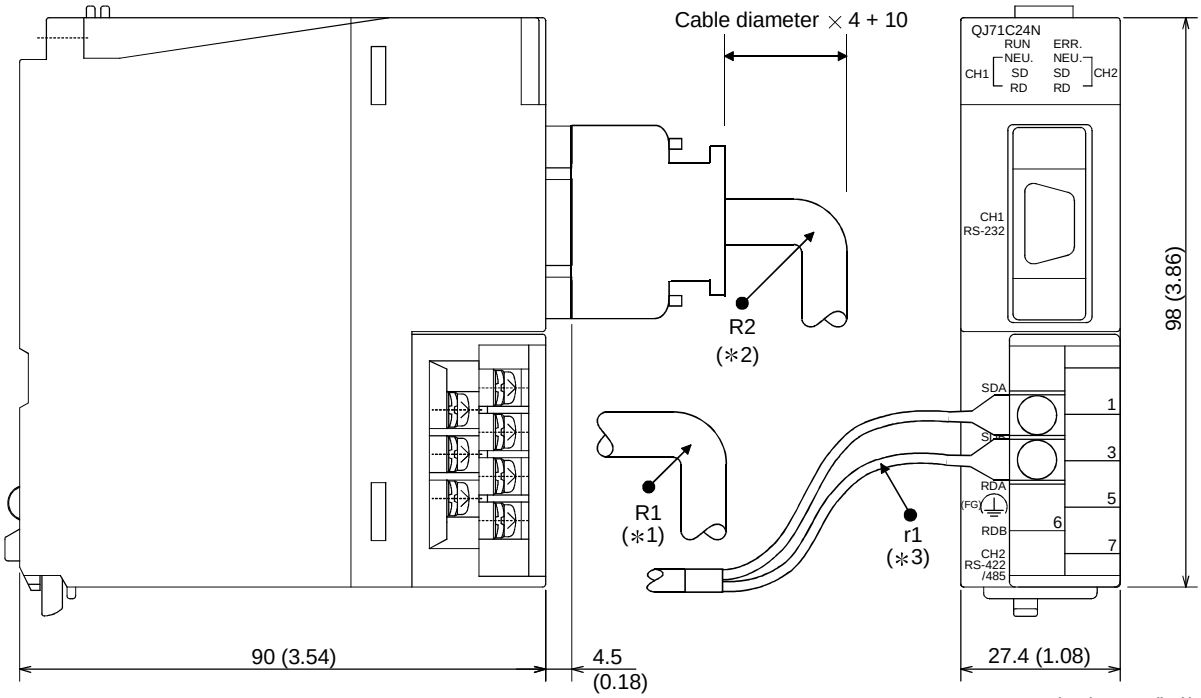
Appendix 5 External Dimensions

(1) QJ71C24N, QJ71C24

The following diagram shows the QJ71C24 and QJ71C24N. The dimensions of the QJ71C24 are the same as QJ71C24N (except for model name).



(Unit: mm (in.))

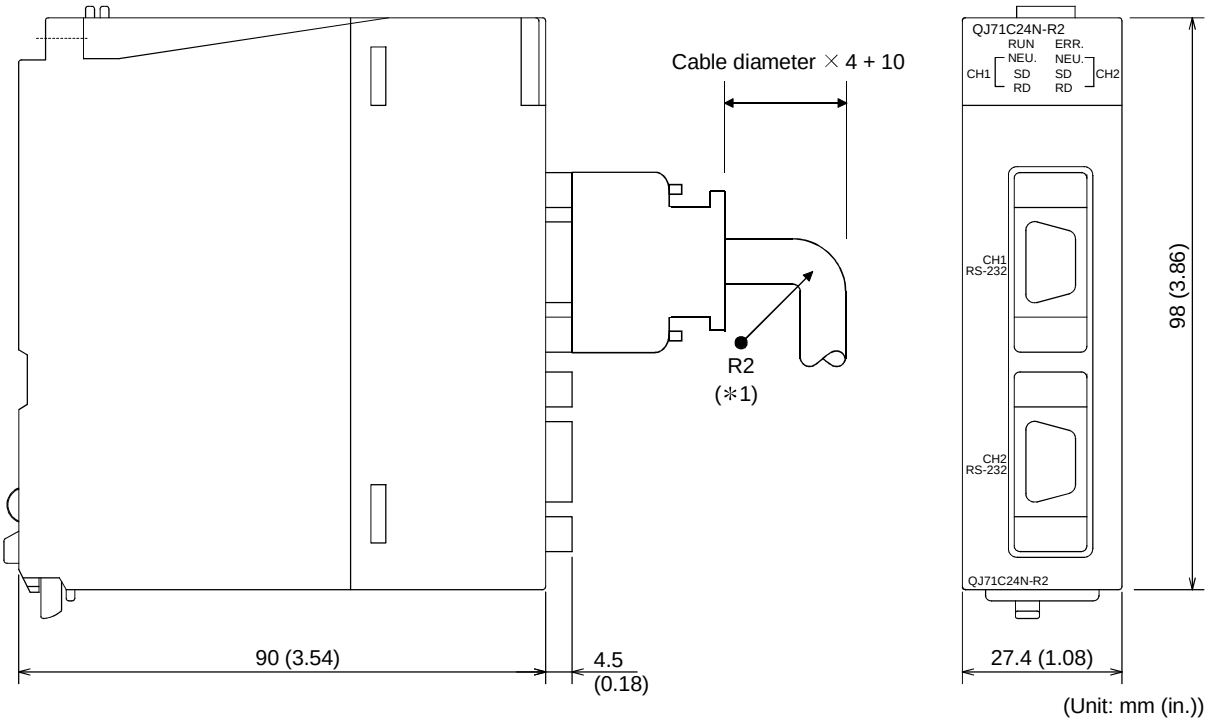
∗1: R1 (Bending radius near terminal block): Cable diameter × 4

∗2: R2 (Bending radius near connector) : Cable diameter × 4

∗3: r1 (Bending radius near crimp contact) : Connectable as long as not bended extremely

(2) QJ71C24N-R2, QJ71C24-R2

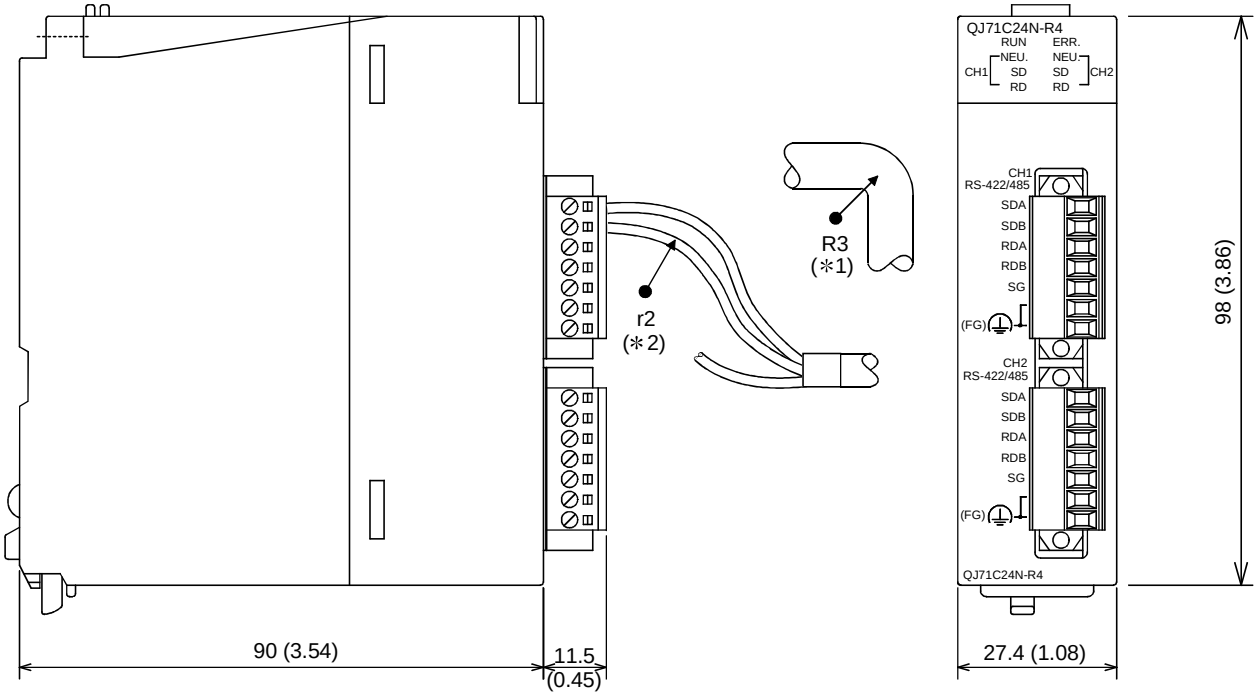
The following diagram shows the QJ71C24-R2 and QJ71C24N-R2. The dimensions of the QJ71C24-R2 are the same as QJ71C24N-R2 (except for model name).



(Unit: mm (in.))

*1: R2 (Bending radius near connector) : Cable diameter × 4

(3) QJ71C24N-R4



(Unit: mm (in.))

*1: R3 (Bending radius near the plug-in socket block): Cable diameter × 4

*2: r2 (Bending radius near the wire connection) : Connectable as long as not bended extremely

Appendix 6 Example of Connection when a Converter is Used

The following shows an example of a connection where the RS-232 to RS-422/485 converters are used in order to communicate data using data communication functions with the MC, non-procedure, or bidirectional protocol.

The converters covered in the Appendix are as follows:

Manufacturer	Model name (Recommended product)	Contact	Tel No. Fax No.
EL Engineering Ltd.	EL-LINE-II	Funato-cho 7-16, Nakagawa-ku, Nagoya, 454-0805	Tel: (052) 361-2290 Fax: (052) 363-1050
System Sacom Co., Ltd.	KS-1 KS-10P KS-485	Shibuya Property West Bldg 12F, Higashi 1-32-12 , Shibuya-ku, Tokyo, 150-0011	Tel: (03) 3797-0211 Fax: (03) 3797-0231

* A recommended product is a product that this company has verified and has found to satisfy this company's standards. When using this products, use it so that it conforms to the recommended product's specifications (standards).

(1) Combination between available converters and connections

Q series C24 side connection interface	System configuration with external devices	External device interface	Available converter	Description No. of connection example
RS-232	1:1	RS-422	EL-LINE-II	Connection example 1
			KS-1 KS-10P	Connection example 2
		RS-485	KS-485	Connection example 3
RS-422/485	1:1, 1:n, m:n	RS-232	KS-485	Connection example 4

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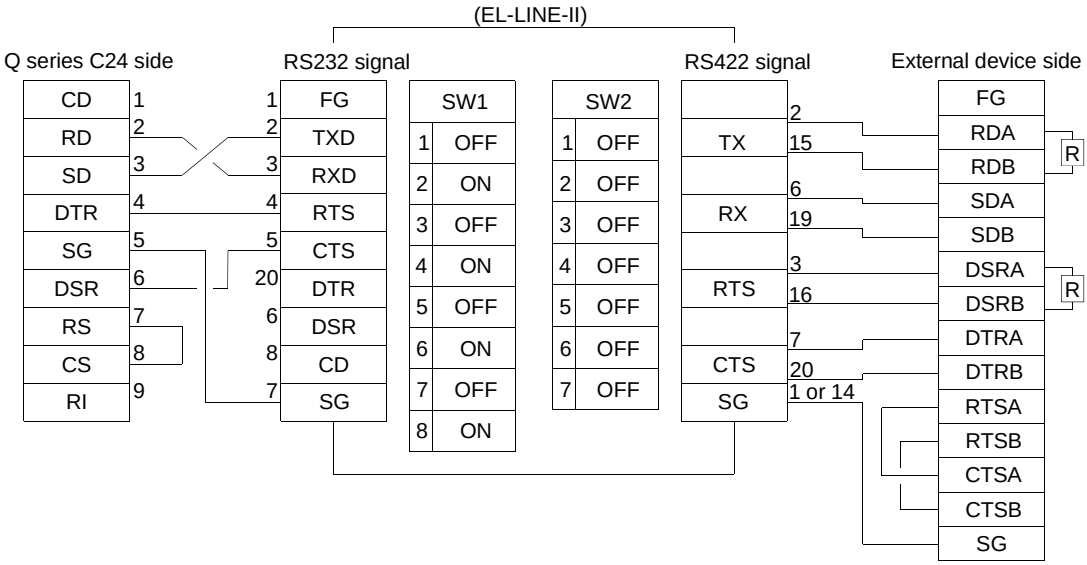
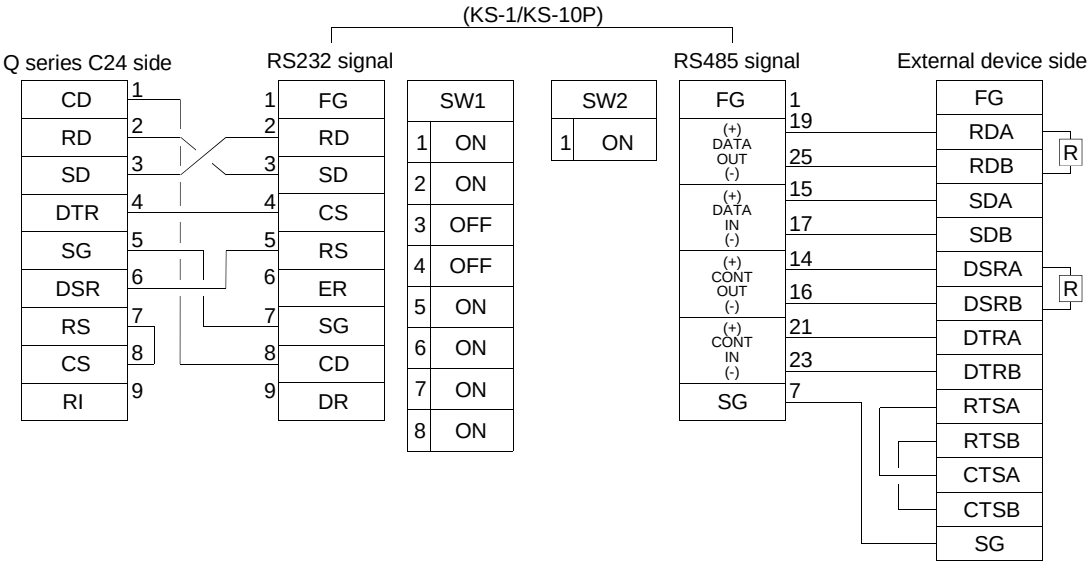
(2) Connection example

(Connection example 1)



* • The CD terminal check setting should be set to "No check" according to the explanation in Section 3.2.1 (1).
  • DC code control or DTR/DSR control becomes possible for transmission control.

(Connection example 2)



* • The CD terminal check setting should be set to "No check" according to the explanation in Section 3.2.1 (1).
  • DC code control or DTR/DSR control becomes possible for transmission control.

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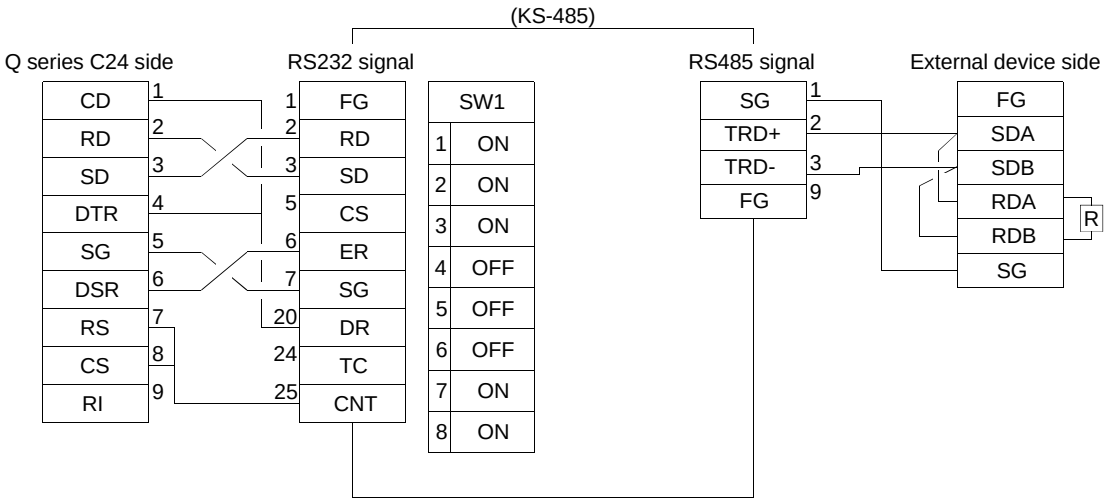
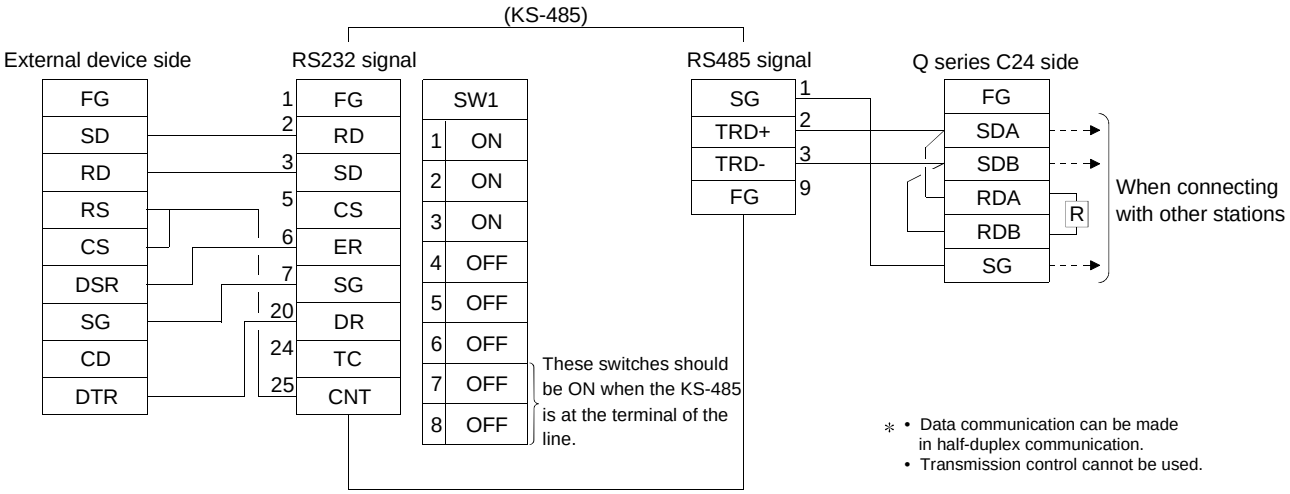
(Connection example 3)



∗ • Data communication can be made in half-duplex communication.
• The CD terminal check setting should be set to "No check" according to the explanation in Section 3.2.1 (1).
• Transmission control cannot be used.

(Connection example 4)



∗ • Data communication can be made in half-duplex communication.
• Transmission control cannot be used.

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Appendix 7 Communication Support Tool (MX Component)

MX Component is an ActiveX control library that supports any types of communication paths between IBM PC/AT compatible personal computers and PLCs. It allows the users to establish communication using simple processing only, without having to know about the different communication protocols used in the individual communication.
It also supports various programming languages, allowing for a wide range of application development.

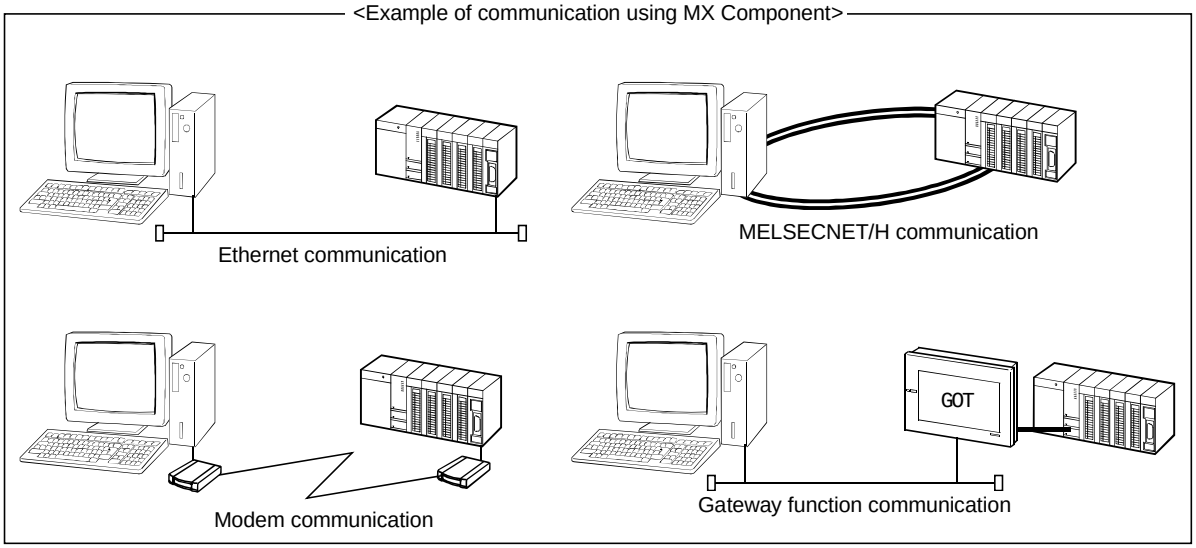
This section provides the overview of the functions provided by MX Component and explains the procedure up to creation of applications.
* See Operating Manual and Programming Manual of MX Component for the details.

Appendix 7.1 Overview of MX Component

This section provides the overview of MX Component.
Different communication paths, operating systems, programming languages, and functions are supported depending on the version of MX Component used.

(1) Support for a wide range of communication paths to PLCs

MX Component supports a wide range of communication paths to PLCs. It is possible to construct systems according to the needs of the users.



(2) Dramatic improvement of application development efficiency

MX Component provides wizard-style communication setting utilities.
The user only needs to select settings from menus displayed on the screen in an interactive manner to achieve the communication settings required to access the target PLC CPU.
Moreover, once the communication setting has been performed, it is possible to access the PLC CPU simply by specifying the logical station number that is stored via the communication setting utilities.

(3) Support for wide choice of basic operating systems

MX Component can run on IBM PC/AT compatible personal computers running the following basic operating systems:

- Microsoft® Windows® 95 Operating System
- Microsoft® Windows® 98 Operating System
- Microsoft® Windows NT® Workstation Operating System Version 4.0
- Microsoft® Windows® Millennium Edition Operating System
- Microsoft® Windows® 2000 Professional Operating System
- Microsoft® Windows® XP Professional Operating System
- Microsoft® Windows® XP Home Edition Operating System

(4) Support for a wide variety of programming languages

MX Component supports the following programming languages.
It allows the user to develop a wide range of customized applications.

Programming language	Development software
Visual Basic®	Microsoft® Visual Basic® 6.0
Visual C++®	Microsoft® Visual C++® 6.0
VBScript	Text editors and commercially available HTML tools
VBA	Microsoft® Excel 2000, Microsoft® Excel 2002, Microsoft® Access 2000 or Microsoft® Access 2002

(5) Support for functions dedicated for data communication with PLCs

MX Component provides the functions necessary for data communication with PLCs, including functions for opening/closing communication lines and reading/writing devices.
Multi-function communication programs can thus easily be developed with MX Component.

Function name	Function
Connect	Connects a telephone line.
Open	Opens a communication line.
Close	Closes a communication line.
Disconnect	Disconnects a telephone line.
GetErrorMessage	Displays error definition and corrective action.
ReadDeviceBlock	Batch-reads data from devices. (LONG type)
WriteDeviceBlock	Batch-writes data to devices. (LONG type)
ReadDeviceBlock2	Batch-reads data from devices. (SHORT type/INT type)
WriteDeviceBlock2	Batch-writes data to devices. (SHORT type/INT type)
ReadDeviceRandom	Randomly reads data from devices. (LONG type)
WriteDeviceRandom	Randomly writes data to devices. (LONG type)
ReadDeviceRandom2	Randomly reads data from devices. (SHORT type/INT type)
WriteDeviceRandom2	Randomly writes data to devices. (SHORT type/INT type)
SetDevice	Sets one device. (LONG type)
GetDevice	Acquires the data of one device. (LONG type)
SetDevice2	Sets one device. (SHORT type/INT type)
GetDevice2	Acquires data of one device. (SHORT type/INT type)

Function name	Function
ReadBuffer	Reads from buffer memory.
WriteBuffer	Writes to buffer memory.
GetClockData	Reads clock data from PLC CPU.
SetClockData	Writes clock data to PLC CPU.
GetCpuType	Reads a PLC CPU type.
SetCpuStatus	Remote RUN/STOP/PAUSE of PLC CPU
EntryDeviceStatus	Registers device status monitor.
FreeDeviceStatus	Deregisters device status monitor.
OnDeviceStatus	Announces event.

(6) Collecting data on Excel without programming

Using MX Component and MX Sheet (SWnD5C-SHEET-E) allows users to collect PLC device data on Excel with only simple setting and without any programming.

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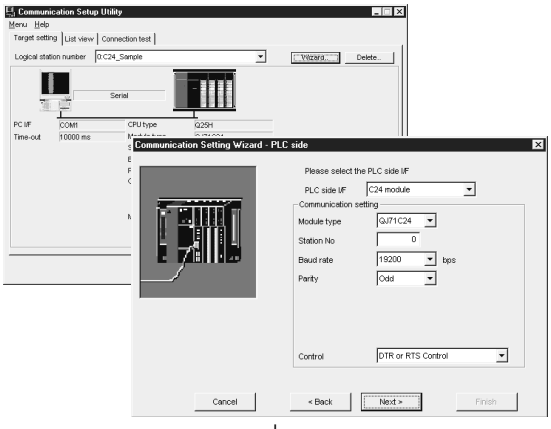
Appendix 7.2 Usage Procedure of MX Component

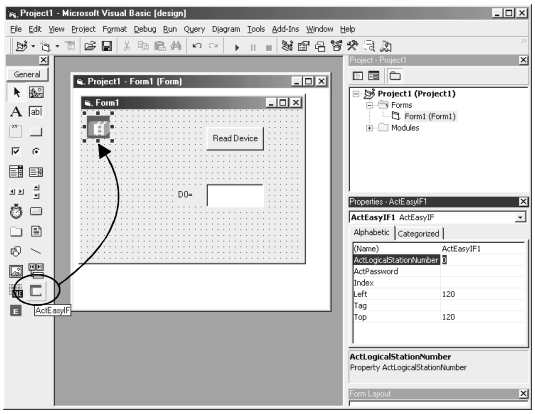
This section explains the procedure for creating programs and sample programs using MX Component.

(1) Procedure for creating programs

The procedure for creating programs is outlined below.
The usage procedure below uses Visual Basic® as an example.

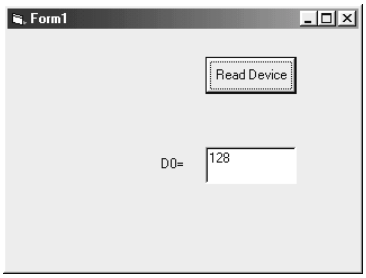


1) Perform the communication settings from a IBM PC/AT compatible personal computer to the PLC by following the wizard. (Some types of controls are set only by programs without using the wizard.)
The wizard allows the user to perform the settings required for the communication such as logical station number, connected module type, and PLC to be connected.



2) Paste the ACT control icon onto the form and assign the logical station number set in step 1 to the property of the pasted control.

3) Use the functions provided by the software to write a program that reads the device data.



Completed

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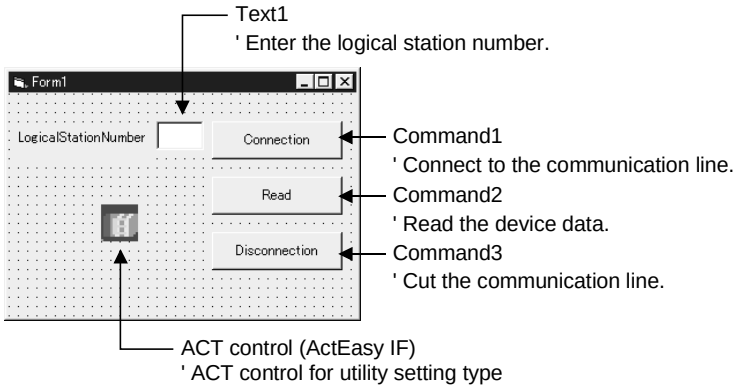
(2) Sample program

The following sample program reads D0 to D4 (five points) of the target PLC using the logical station number.

(a) When Visual Basic® is used

1) Screen example (Form1)



2) Program example

```
Private Sub Command1_ Click()
' ********************
'     Connection
' ********************
Dim rtn As Long
    ' Get LogicalstationNumber
    ActEasyIF1. ActLogicalStationNumber = Val(Text1.Text)
    ' Connection
    rtn = ActEasyIF1. Open()
    If rtn = 0 Then
        MsgBox "The connection was successful"
    Else
        MsgBox "Connection Error:" & Hex(rtn)
    End If
End Sub

Private Sub Command2_ Click()
' ********************
'     Read
' ********************
Dim rtn As Long
Dim idata(5) As Integer
    ' D0-D4 are read
    rtn = ActEasyIF1. ReadDeviceBlock2 ("D0", 5, idata(0))
    If rtn = 0 Then
        MsgBox "D0-D5 = " & idata(0) & ", " & idata(1) & ", " & idata(2) & ", " & idata(3) & "," & idata(4)
    Else
        MsgBox "Read Error:" & Hex(rtn)
    End If
End Sub
```

```
Private Sub Command3_ Click()
' ********************
'     Disconnection
' ********************
Dim rtn As Long
    ' Disconnection
    rtn = ActEasyIF1. Close()
    If rtn = 0 Then
        MsgBox "The disconnection was successful"
    Else
        MsgBox "Disconnection Error:" & Hex(rtn)
    End If
End Sub
```

(b) When Visual C++® is used

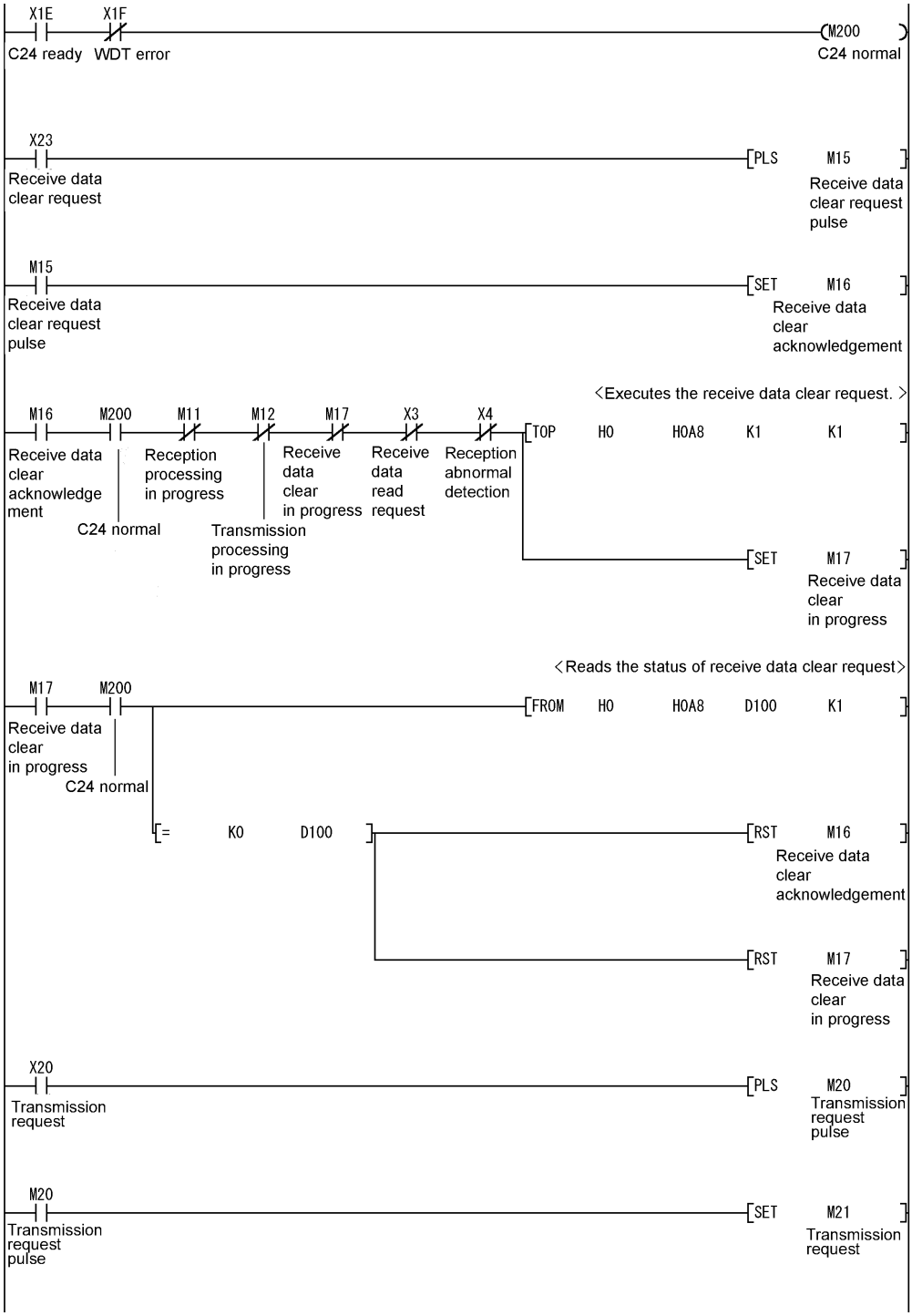
```
// ********************
//     Connection
// ********************
void CVCDlg::OnOpen()
{
       long lRet;
       CString szMessage;

       UpdateData();
    // Get LogicalStationNumber
       m_ actEasyIF. SetActLogicalStationNumber ( m_ lLogicalStationNumber ):
    // Connection
       lRet = m_ actEasyIF. Open();
       if ( lRet == 0) {
              MessageBox ( "The connection was successful" )
       } else {
              szMessage. Format ( "Connection Error: %x", lRet );
              MessageBox ( szMessage )
       }
}
```

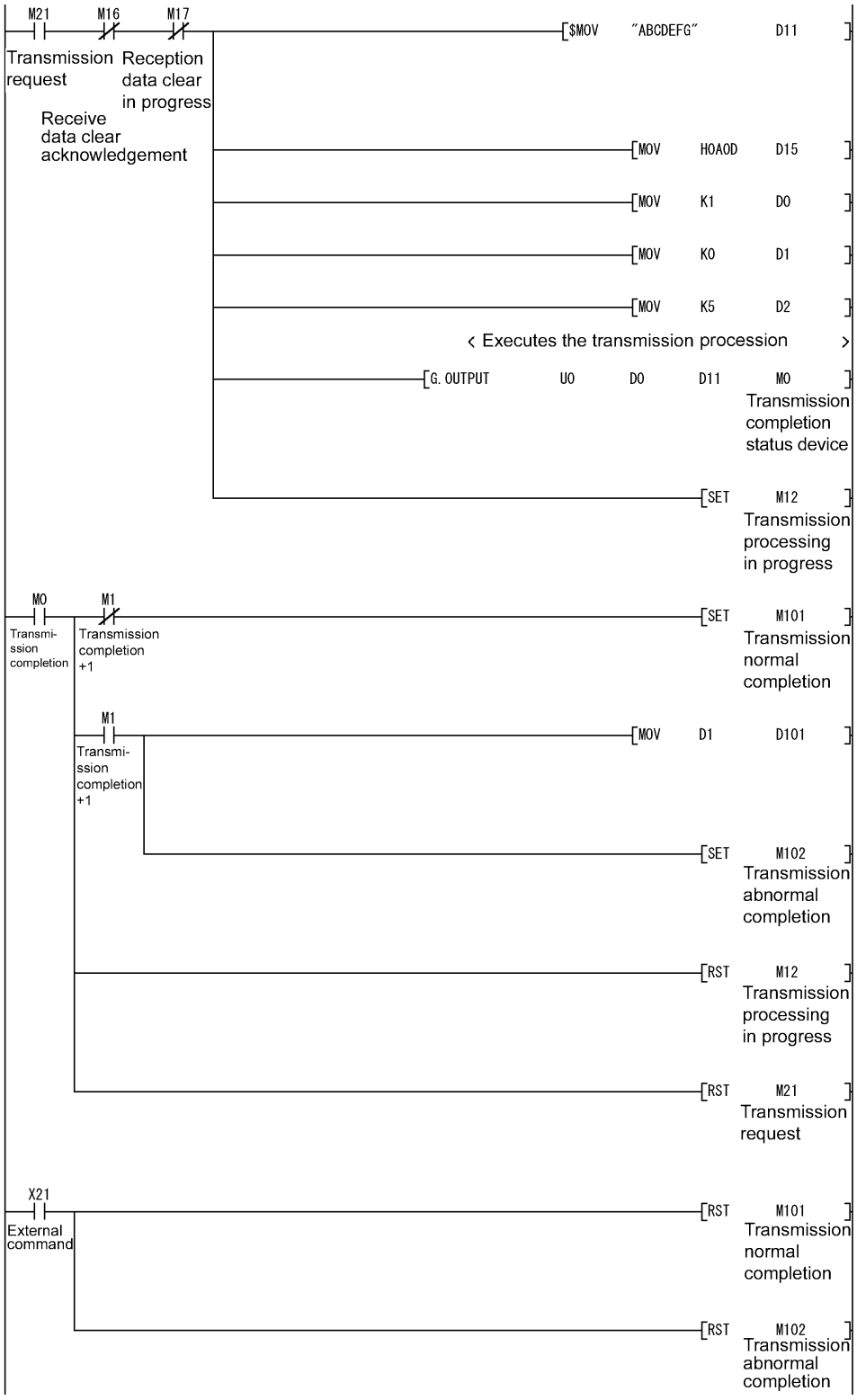
```
// ********************
//      Read
// ********************
void CVCDlg::OnRead()
{
        long lRet;
        short sData[5];
        CString szMessage;
      // D0-D4 are read
        lRet = m_ actEasyIf. ReadDeviceBlock2 ( "D0", 5, sData );
        if ( lRet == 0) {
                szMessage. Format ( "D0-D5 = %d, %d, %d, %d, %d",
                                                sData[0], sData[1], sData[2], sData[3], sData[4] );
                MessageBox ( szMessage );
        } else {
                szMessage. Format ( "Read Error: %x", lRet );
                MessageBox ( szMessage )
        }
}

// ********************
//      Disconnection
// ********************
void CVCDlg::OnOpen()
{
        long lRet;
        CString szMessage;
        // Disconnection
          lRet = m_ actEasyIF. Close();
          if ( lRet == 0) {
                    MessageBox ( "The disconnection was successful" )
        } else {
                    szMessage. Format ( "Disconnection Error: %x", lRet );
                    MessageBox ( szMessage )
        }
}
```

Appendix 8 Example of Clear Process Program for Receive Data

When performing data communications with non procedure protocol, use the receive data clear request shown in 6.1.4. and display the sequence program example if clearing the receive data from external device. (If the Q series C24 input/output signal is X/Y000 to X/Y01F.)

The following I/O signals (X) and internal relays (M) are used in the program.





POINT

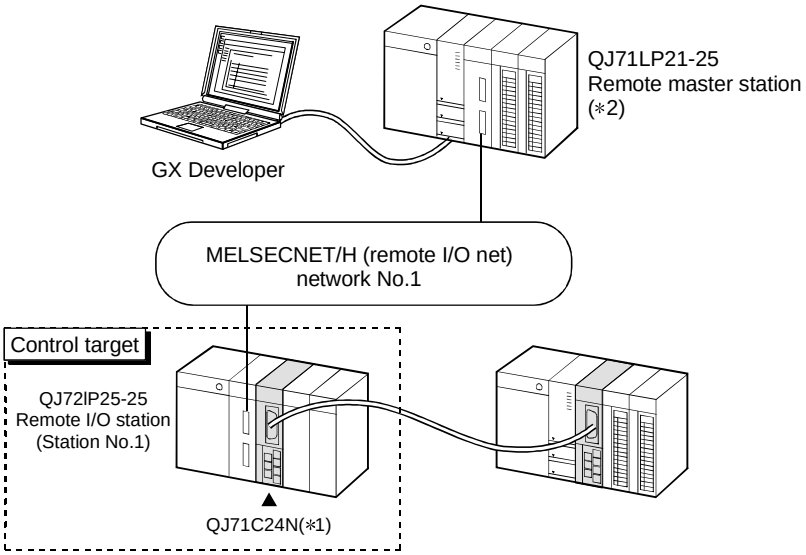
When a function version A for the Q Series C24 is used, add the partial circuit (shown with ＊1) shown in the program example in Section 6.1.4 (3). (Communications are possible when M19 is ON.)

Appendix 9 Program Examples for Using Q Series C24 at MELSECNET/H Remote I/O Station

Appendix 9.1 System configuration and program conditions

(1) System configuration

The system configuration used in the program examples of this section is shown below.



*1 It is assumed that the QJ71C24N is mounted on Slot 0 of the base unit and the starting I/O No. is "0".

*2 Set the network parameters of the remote master station as shown below.

1) Network type : MNET/H (Remote master)
2) Starting I/O No. : 0000H
3) Network No. : 1
4) Total stations : 1
5) Mode : Online
6) Network range assignment (XY setting)

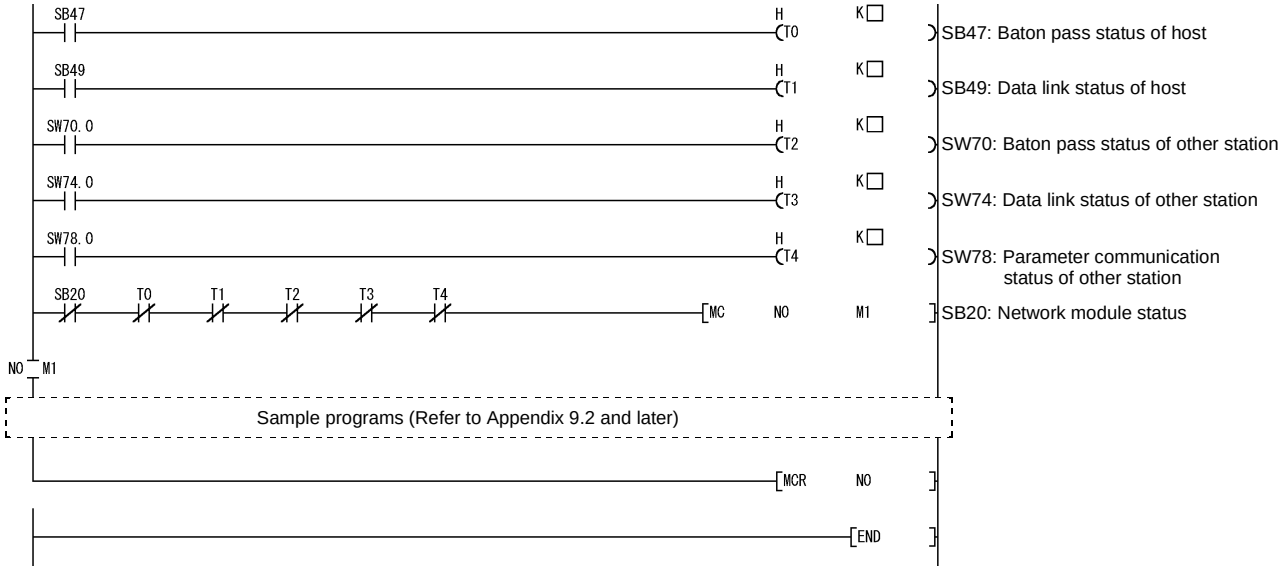
StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	64	1000	103F	64	0000	003F	64	1000	103F	64	0000	003F

7) Refresh parameters

	Link side					PLC side			
	Dev. name	Points	Start	End		Dev. name	Points	Start	End
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF
Random cyclic	LB				↔				
Random cyclic	LW				↔				
Transfer1	LX	64	1000	103F	↔	X	64	1000	103F
Transfer2	LY	64	1000	103F	↔	Y	64	1000	103F
Transfer3					↔				
Transfer4					↔				
Transfer5					↔				
Transfer6					↔				

(2) Program example for interlocking the remote master station and remote I/O station

Interlocks should be applied to the programs according to the link status of the remote master station (host station) and remote I/O station (other station).
The following example shows an interlock in the communication program that uses the link status (SB47, SB49) of the remote master station and the link status (SW70 bit 0, SW74 bit 0, SW78 bit 0) of the remote I/O station (Station No. 1).



Set the following values for the timer constant K□.

Baton pass status (T0, T2)	More than (sequence scan time × 4)
Cyclic transmission status Parameter communication status (T1, T3, T4)	More than (sequence scan time × 3)

Reason: This way the control is not stopped even if the network detects an instantaneous error due to a faulty cable condition and noise interference.
Also, the multipliers of 4 and 3 should only be considered as a guideline.

(3) REMFR/REMTO instruction

Perform programming so that the next instruction is executed after the REMFR/REMTO instruction is executed and then completed.
The completion of the REMFR/REMTO instruction can be confirmed by the completion device.

POINT

(1) After the execution of the REMFR/REMTO instruction, several scans are required before the read/write of the actual data is completed.
(2) For the interlock program for the remote master station and remote I/O station of the MELSECNET/H and details of the REMFR/REMTO instruction, refer to the "Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network)".

Appendix 9.2 When accessing buffer memory using sequence program

In the following program example, data are read from or written to the buffer memory of the Q series C24 using the REMFR/REMTO instruction.

POINT
Use GX Configurator-SC to change the default value of the buffer memory. Using GX Configurator-SC, save the new setting value to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program reads data from or writes data to the QJ71C24N buffer memory (CH1 side word/byte units designation area) when the read/write command (X1020, X1021) turns ON.

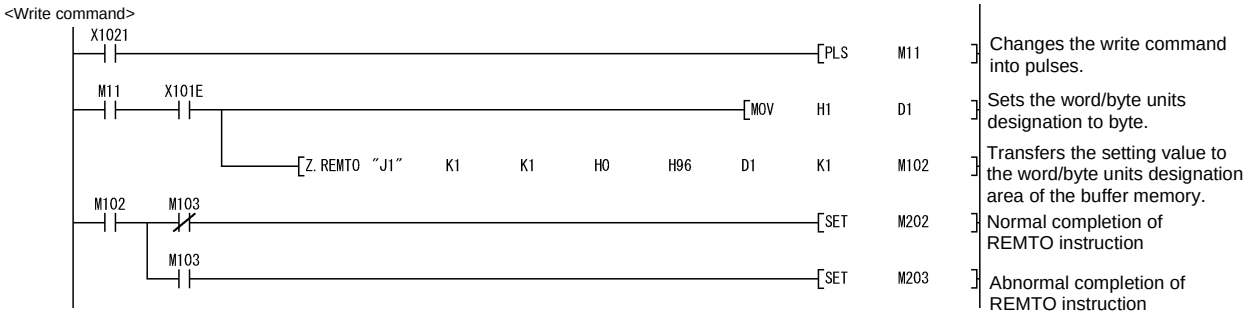
(a) Devices used:

- Read/write command..... X1020, X1021
- Read/write command pulse signal M10, M11
- Completion device for REMFR/REMTO instruction ..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction..... M200 to 203
- Read from word/byte units designation area D0
- Write to word/byte units designation area..... D1

(2) Program examples

(a) Read from buffer memory

(b) Write to buffer memory



Appendix 9.3 When sending on-demand data

The following program example sends on-demand data using the REMFR/REMTO instruction and I/O signals.
For the on-demand function, refer to Section 3.11 of the Reference Manual and Chapter 10 of the User's Manual (Application).

(1) Program conditions

The following program sends on-demand data from the CH1 side when the transmission command (X1022) turns ON.

(a) Devices used:

- Transmission command X1022
- Transmission command pulse signal M10
- On-demand function designation command M11
- On-demand data transmission flag M12
- On-demand execution result acquisition command M13
- LED ON status acquisition command M14
- Completion device for REMFR/REMTO instruction ..... M100 to 107
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 204
- Normal/abnormal completion of on-demand data transmission M300, M301
- Transmission data D0, D1
- Buffer memory head address designation for on-demand function D2
- Data length designation for on-demand function D3
- On-demand execution result D8
- LED ON status and communication error status on CH1 side D9

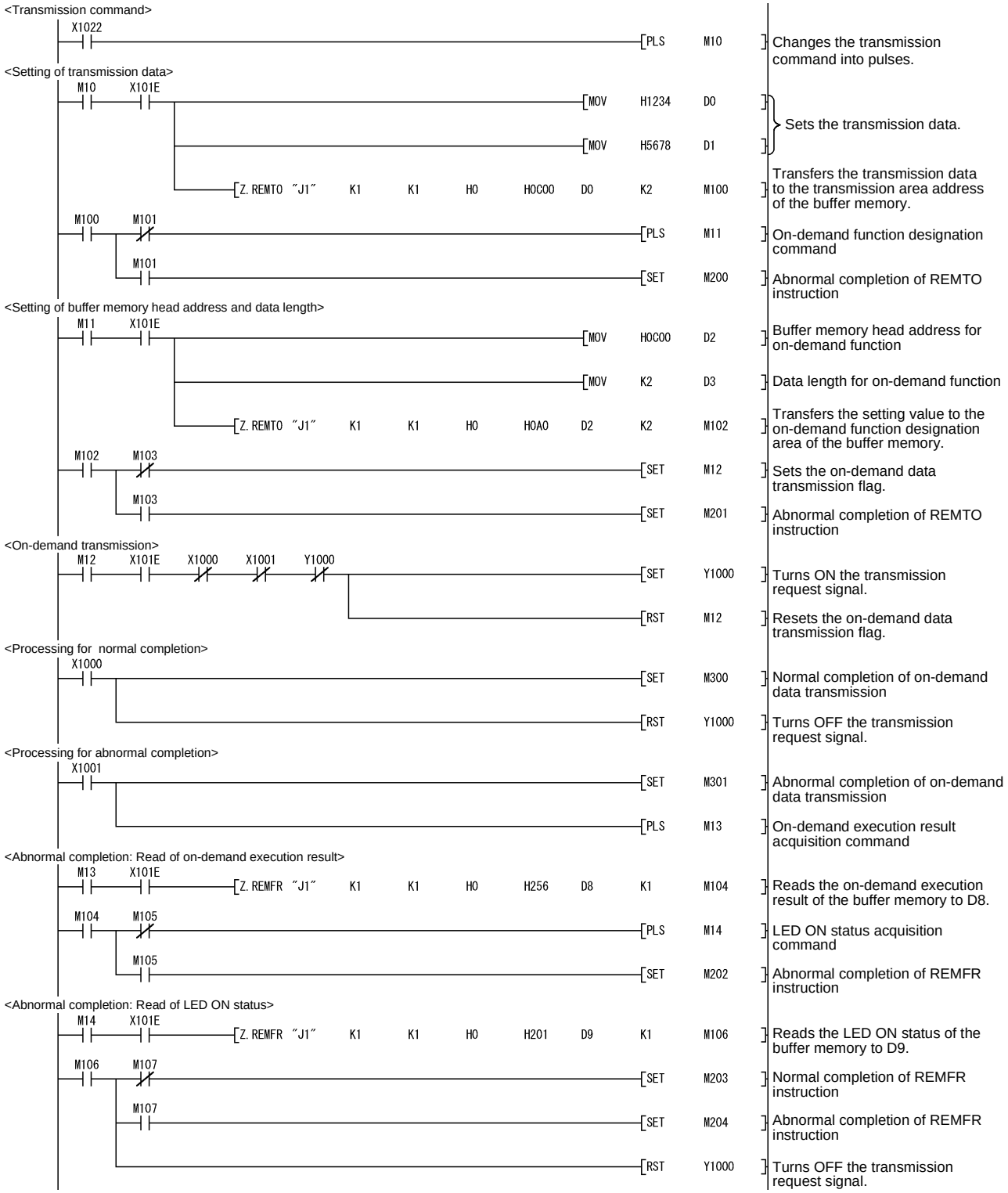
(b) Intelligent function module switch settings (Refer to Section 4.5.2)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07E2H
	b1	ON		Data bit	8 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	ON		Sum check code	Yes	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		MC protocol format 1	0001H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Word units
160 (A0H)	Buffer memory head address designation for on-demand function designation	0C00H
161 (A1H)	Data length designation for on-demand function designation	2
513 (201H)	LED ON status and communication error status on CH1 side	—
598 (256H)	On-demand execution result	—

(2) Program example



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Appendix 9.4 When receiving data using nonprocedural or bidirectional protocol

The following program example receives data under the nonprocedural protocol (or bidirectional protocol) using the REMFR instruction and I/O signals.
Refer to Chapter 6 for the communication using the nonprocedural protocol.
Refer to Chapter 7 for the communication using the bidirectional protocol.
Refer to Chapter 11 of the User's Manual (Application) for data communication using the user frames.

(1) Program conditions

The following program receives data from the external device by communication using the nonprocedural protocol, then turns ON the receive read request signal (X1003), and reads the received data from the QJ71C24N buffer memory to the PLC CPU.

(a) Devices used:

- Error code read signal X1023
- Receive read request signal M10
- Received data acquisition command M11
- Receive result acquisition command..... M12
- Completion device for REMFR instruction ..... M100 to 105
- Normal/abnormal completion flag for REMFR instruction ..... M200 to 203
- Normal/abnormal completion of receive M300, M301
- Received data count D0
- Received data (when 5-word data are received)..... D1 to D5
- Data reception result..... D8000

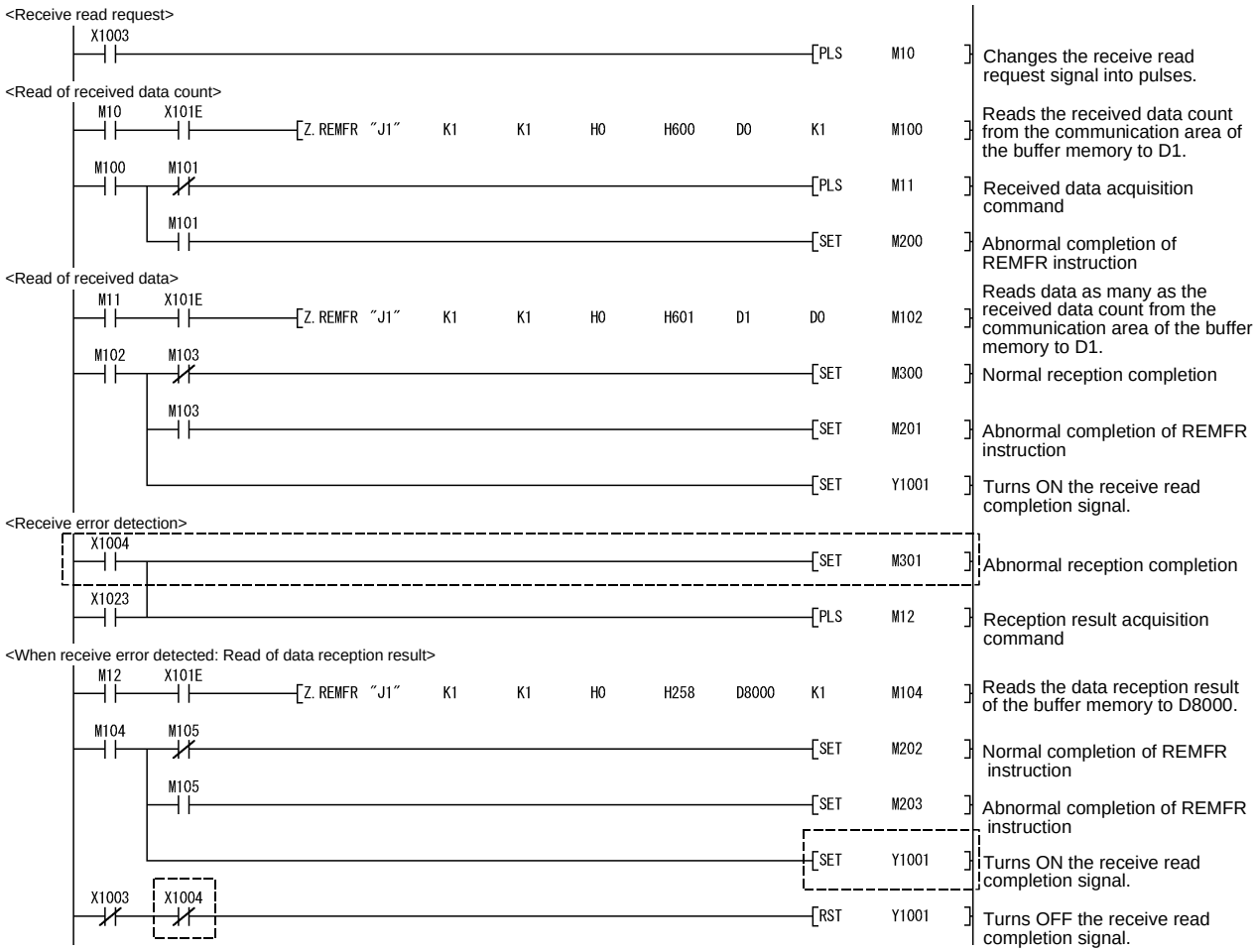
(b) Intelligent function module switch settings (Refer to Section 4.5.2)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C0H
	b1	OFF		Data bit	7 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol	0006H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Word units
164 (A4H)	Received data count designation	01FFH
165 (A5H)	Receive complete code designation	0D0AH
166 (A6H)	Receive buffer memory head address designation	0600H
167 (A7H)	Receive buffer memory length designation	0200H
600 (258H)	Data reception result	—

(2) Program example



REMARK

When data reception is executed by the bidirectional protocol, the area enclosed by the dotted line shown above must be removed.
Set the intelligent function module switches as indicated below. (Refer to Section 4.5.2.)

Switch No.	Setting value
Switch 1	$07C0_H$
Switch 2	0007_H

Appendix 9.5 When sending data using nonprocedural or bidirectional protocol

The following program example sends data under the nonprocedural protocol (or bidirectional protocol) using the REMFR/REMTO instruction and I/O signals.
Refer to Chapter 6 for the communication using the nonprocedural protocol, and to Chapter 7 for the communication using the bidirectional protocol.

(1) Program conditions

The following program sends data from the CH1 side when the transmission signal (X1024) turns ON.

(a) Devices used:

- Transmission command X1024
- Transmission command pulse signal..... M10
- Transmission result acquisition command..... M11
- Completion device for REMFR/REMTO instruction ..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction..... M200 to 202
- Normal/abnormal completion of transmission..... M300, M301
- Transmission data count D10
- Transmission data (5 words) ..... D11 to D15
- Data transmission result D20

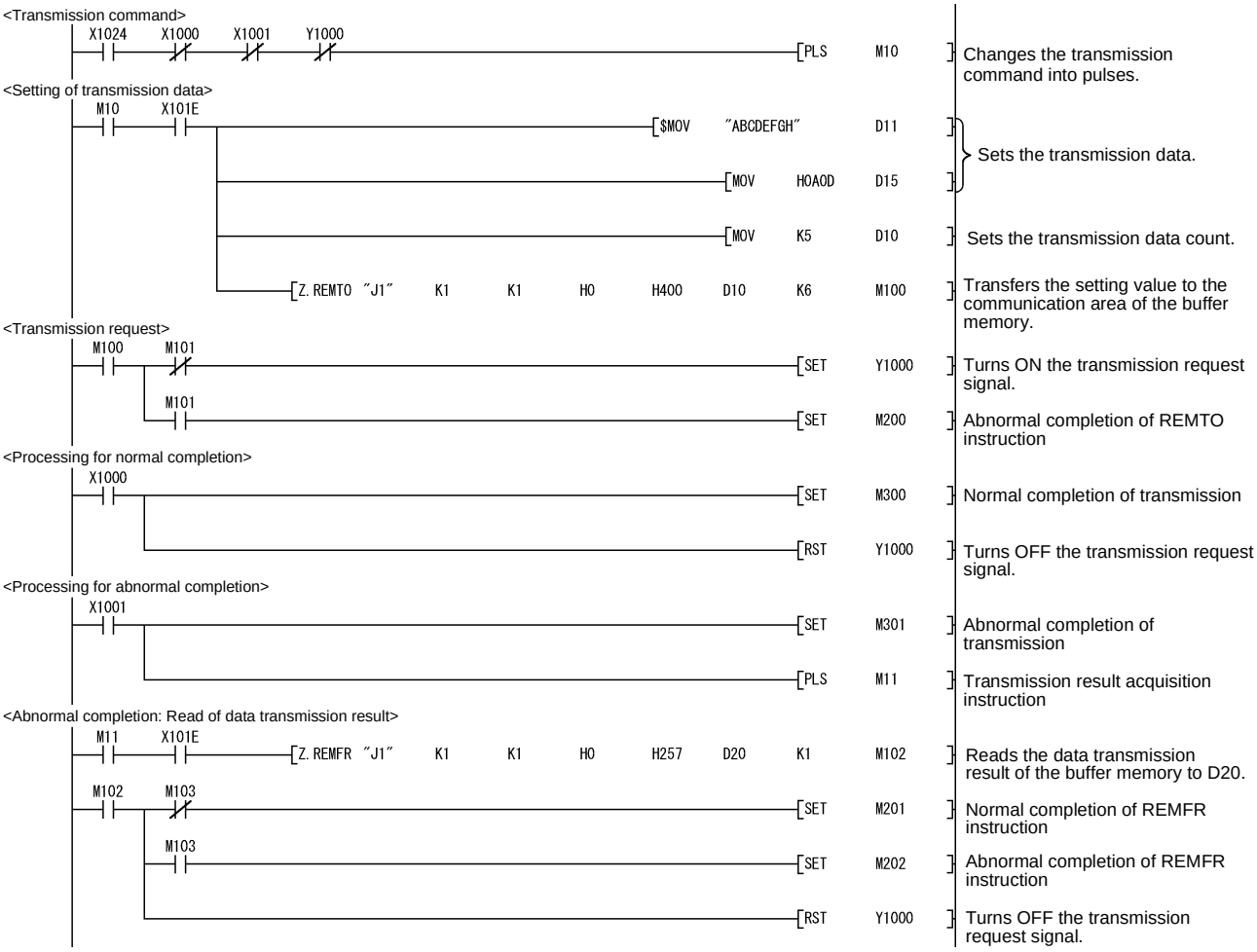
(b) Intelligent function module switch settings (Refer to Section 4.5.2)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C0H
	b1	OFF		Data bit	7 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol or bidirectional protocol	0006H or 0007H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Word units
162 (A2H)	Transmission buffer memory head address designation	0400H
163 (A3H)	Transmission buffer memory length designation	0200H
599 (257H)	Data transmission result	—

(2) Program example



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Appendix 9.6 When clearing received data

The following program example uses the receive data clear request area of the buffer memory.
Refer to Section 6.1.4 for received data clear.

(1) Program conditions

The following program clears the received data in the OS area of the QJ71C24N when the receive clear command (X1025) turns ON.

(a) Devices used:

- Receive clear command X1025
- Receive clear processing execution command M10
- Receive processing flag..... M11
- Transmission processing flag..... M12
- Receive clear command pulse signal M15
- Receive clear acceptance flag M16
- Receive clearing flag..... M17
- Communication disable flag M18
- Communication enable flag..... M19
- Completion check flag M20
- Receive clear processing execution status acquisition command M21
- Receive clear processing execution status judgment command M22
- Completion device for REMFR/REMTO instruction ..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction..... M200, M201
- Receive data clear request area information..... D0
- Clear request..... D1

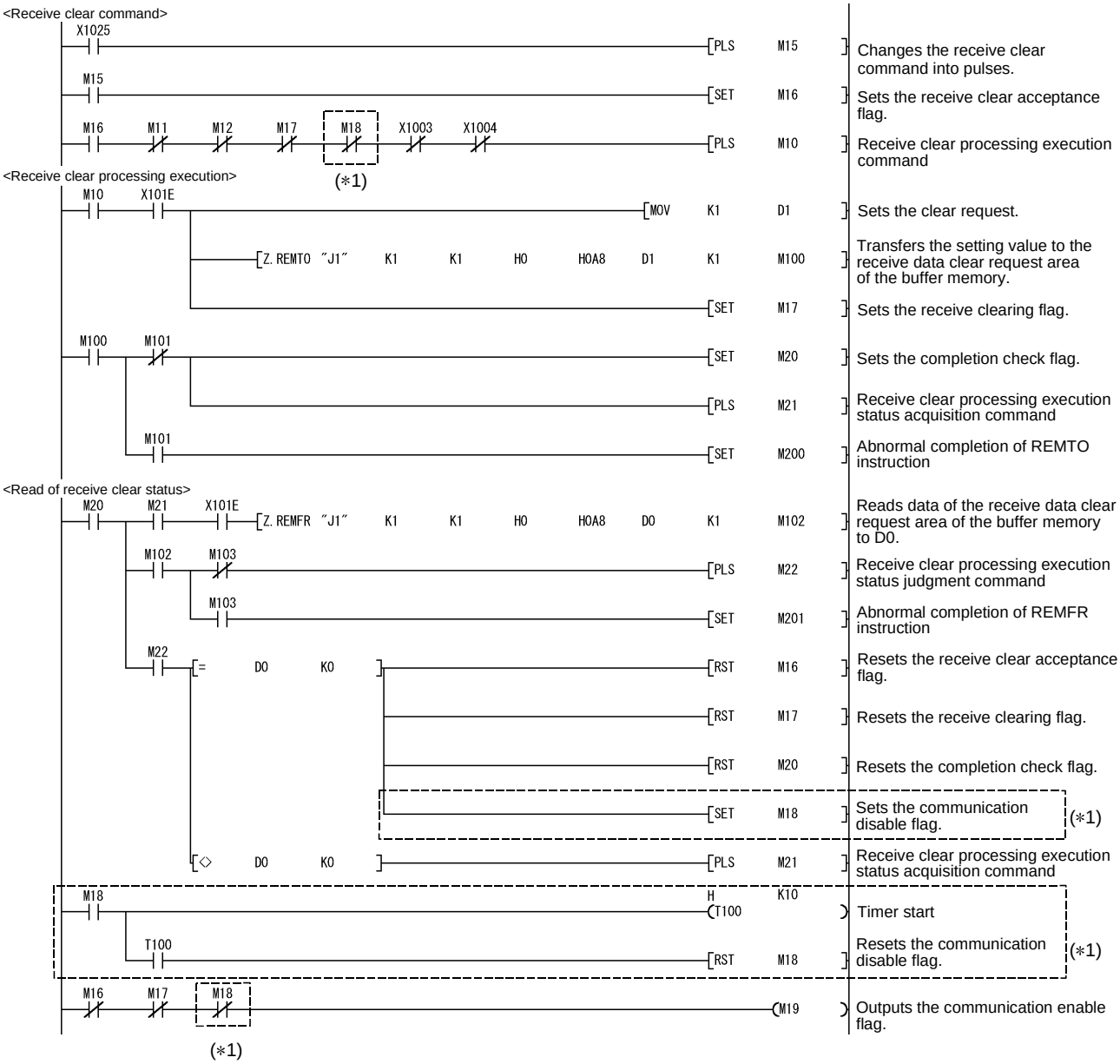
(b) Intelligent function module switch settings (Refer to Section 4.5.2)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C0H
	b1	OFF		Data bit	7 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol	0006H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
168 (A8H)	Receive data clear request	0, 1

(2) Program example



*1 When using the Q series C24 of function version A, add the areas enclosed by the dotted lines to the sequence program. (Make communication when M19 is ON.)

Appendix 9.7 When sending data using user frames

The following program example sends data by the user frames using the REMFR/REMTO instruction and I/O signals.
Refer to Section 11.4 of the User's Manual (Application) for the transmission using the user frames.

(1) Program conditions

The following program sends data using the user frames from the CH1 side when the transmission signal (X1026) turns ON.

(a) Devices used:

- Transmission command X1026
- Transmission command pulse signal..... M10
- Transmission user frame designation command..... M11
- Transmission result acquisition command..... M12
- Completion device for REMFR/REMTO instruction ..... M100 to 105
- Normal/abnormal completion flag for REMFR/REMTO instruction..... M200 to 203
- Normal/abnormal completion of transmission..... M300, M301
- Transmission data count D0
- Transmission data..... D1, D2
- CR/LF output designation..... D5
- Output head pointer designation D6
- Output count designation..... D7
- Output frame No. designation ..... D8 to D12
- Data transmission result D20

(b) Intelligent function module switch settings (Refer to Section 4.5.2)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	$07C2_H$
	b1	ON		Data bit	8 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol	0006_H
Switch 5	—		Station number setting		Station 0	0000_H

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(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name		Setting value
150 (96H)	Word/byte units designation		Byte units
162 (A2H)	Transmission buffer memory head address designation		0400H
163 (A3H)	Transmission buffer memory length designation		0200H
183 (B7H)	CR/LF output designation		0
184 (B8H)	Output head pointer designation		1
185 (B9H)	Output count designation		5
186 (BAH)	First output frame No. designation		03F2H
187 (BBH)	Second output frame No. designation		03F3H
188 (BCH)	Third output frame No. designation		8001H
189 (BDH)	Fourth output frame No. designation		8000H
190 (BEH)	Fifth output frame No. designation		041BH
6912 (1B00H)	For registration No. 8001H	Registered data byte count designation	2
6913 (1B01H)		User frame storage	012DH

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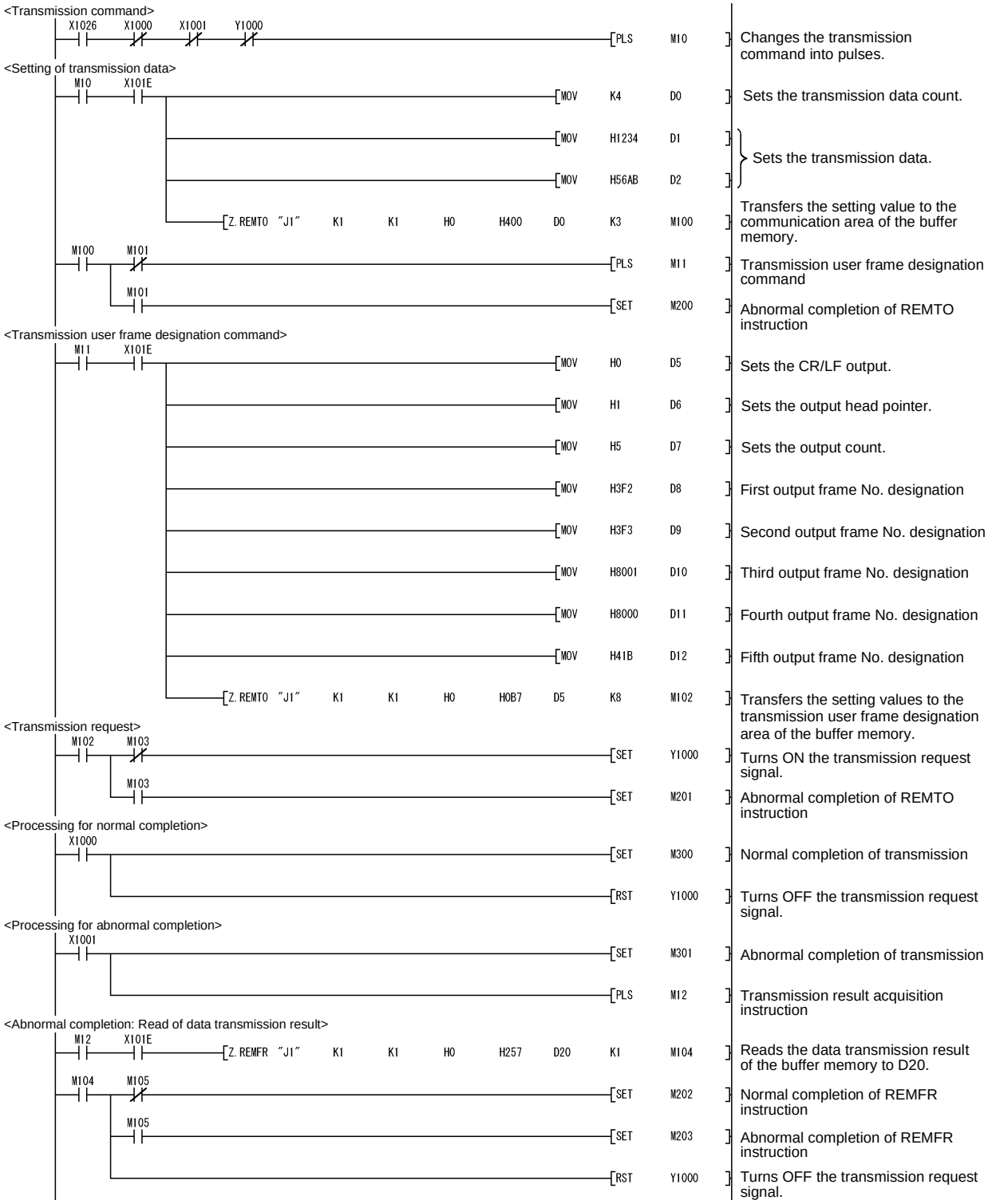
(2) Program example

The user frames No. 3F2H, 3F3H, 41BH and 8001H are assumed to have been registered in advance.



Appendix 9.8 When performing initial setting

The following program example performs initial setting using the REMTO instruction. Execute this program when changing the default values of the Q series C24 buffer memory.
Refer to Chapter 8 when changing the default values of the Q series C24 buffer memory using GX Configurator-SC.

(1) Program conditions

The following program performs initial setting on the CH1 side when the initial setting command (X1027) turns ON.

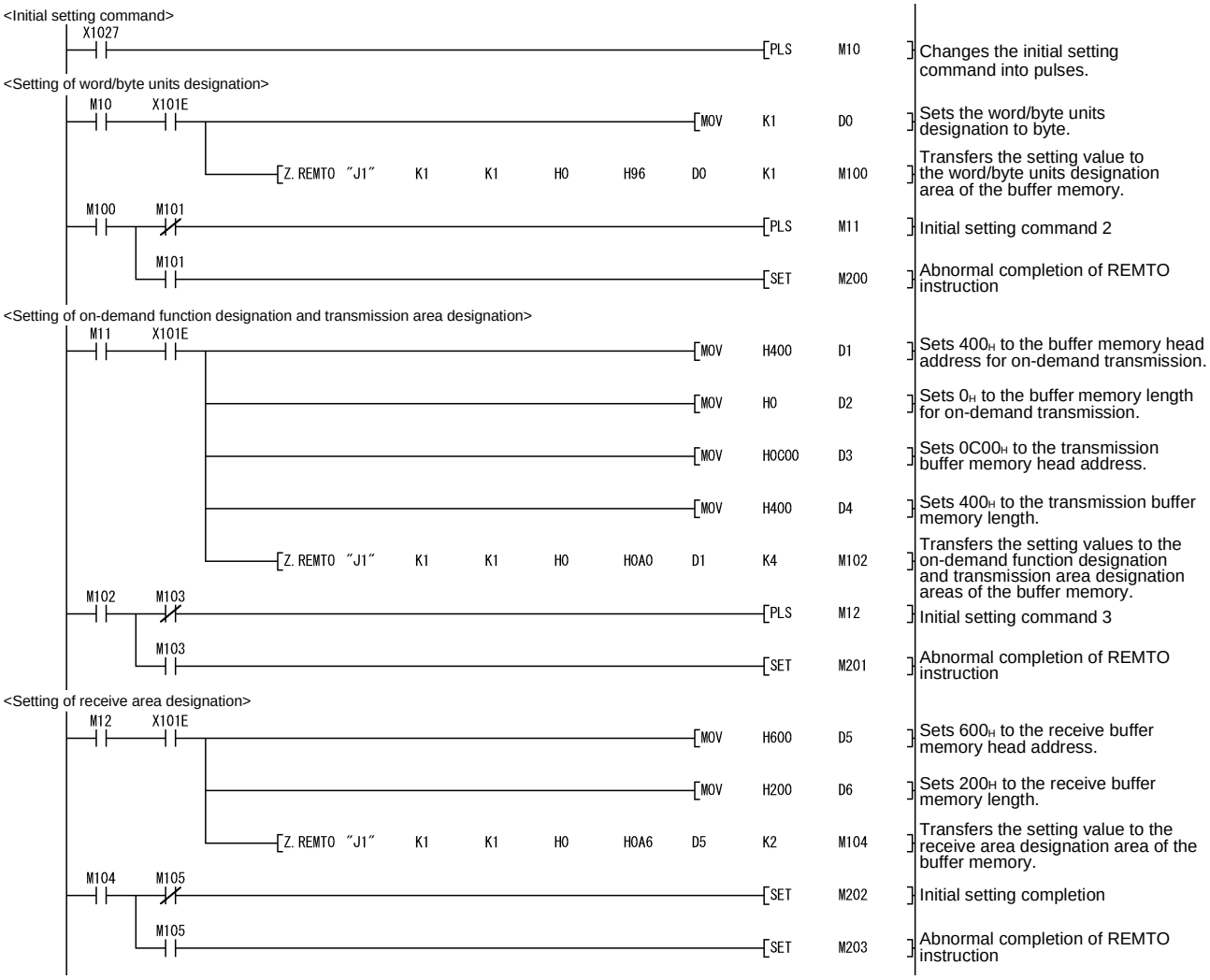
(a) Devices used:

- Initial setting command X1027
- Initial setting command pulse signal M10
- Initial setting command 2 ..... M11
- Initial setting command 3 ..... M12
- Completion device for REMTO instruction M100 to105
- Normal/abnormal completion flag for REMTO instruction ..... M200 to 203
- Word/byte units designation D0
- Buffer memory head address designation for on-demand transmission D1
- Buffer memory length designation for on-demand transmission D2
- Transmission buffer memory head address designation D3
- Transmission buffer memory length designation D4
- Receive buffer memory head address designation D5
- Receive buffer memory length designation D6

(b) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Byte units
160 (A0H)	Buffer memory head address designation for on-demand function designation	0400H
161 (A1H)	Data length designation for on-demand function designation	0000H
162 (B2H)	Transmission buffer memory head address designation	0C00H
163 (A3H)	Transmission buffer memory length designation	0400H
166 (A6H)	Receive buffer memory head address designation	0600H
167 (A7H)	Receive buffer memory length designation	0200H

(2) Program example



REMARK

When changing the default values of the following buffer memory areas, refer to above (2) Program example to perform programming.

- DTR/DSR (ER/DR), DC control designation
- DC1/DC3 (Xon/Xoff) code designation
- DC2/DC4 code designation
- CD terminal check designation (for RS-232)
- Communication system designation (for RS-232)
- Simultaneous transmission priority/non-priority designation
- Retransmission time transmission method designation
- Simultaneously transmission data valid/invalid designation
- No-reception monitoring time (timer 0) designation

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Appendix 9.9 When registering user frame

The following program example registers a user frame to the flash ROM of the Q series C24 using the REMFR/REMTO instruction and I/O signals.
Refer to Section 9.4 of the User's Manual (Application) for the registration of the user frame.

POINT
It is recommended to use GX Configurator-SC when registering a user frame to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program registers a user frame to the flash ROM of the QJ71C24N when the registration command (X1028) turns ON.

(a) Devices used:

- Registration command X1028
- Registration command pulse signal M10
- Registration command 2 ..... M11
- Registration flag M12
- Registration result acquisition command M13
- Completion device for REMFR/REMTO instruction ..... M100 to 105
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 203
- Registration instruction D0
- Frame No. D1
- Registration result D2
- Number of data bytes registered D3
- User frame ..... D4 to 8

(b) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name		Setting value
2 (2H)	For flash ROM access	Register/read/delete instructions	1
3 (3H)		Frame No. direction	03E8H
4 (4H)		Registration/read/delete result storage	—
5 (5H)		Number of data bytes registered designation	10
6 (6H)		User frame	3946H
7 (7H)			3030H
8 (8H)			3030H
9 (9H)			4646H
10 (AH)			3030H

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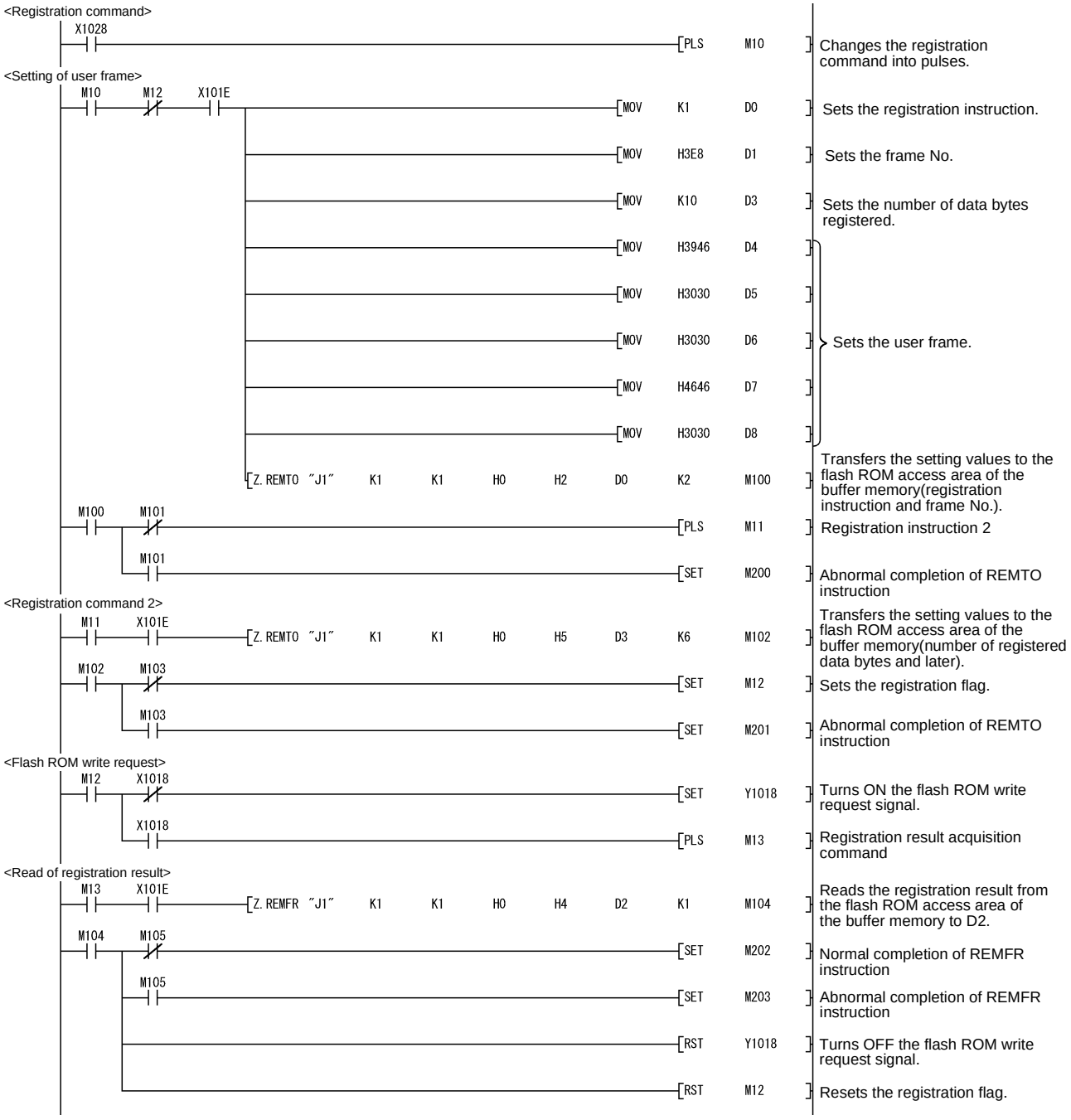
(2) Program example



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Appendix 9.10 When reading user frame

The following program example reads a user frame registered to the flash ROM of the Q series C24 using the REMFR/REMTO instruction and I/O signals.
Refer to Section 9.4 of the User's Manual (Application) for details.

POINT
It is recommended to use GX Configurator-SC when reading a user frame registered to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program reads a user frame registered to the flash ROM of the QJ71C24N when the read command (X1029) turns ON.

(a) Devices used:

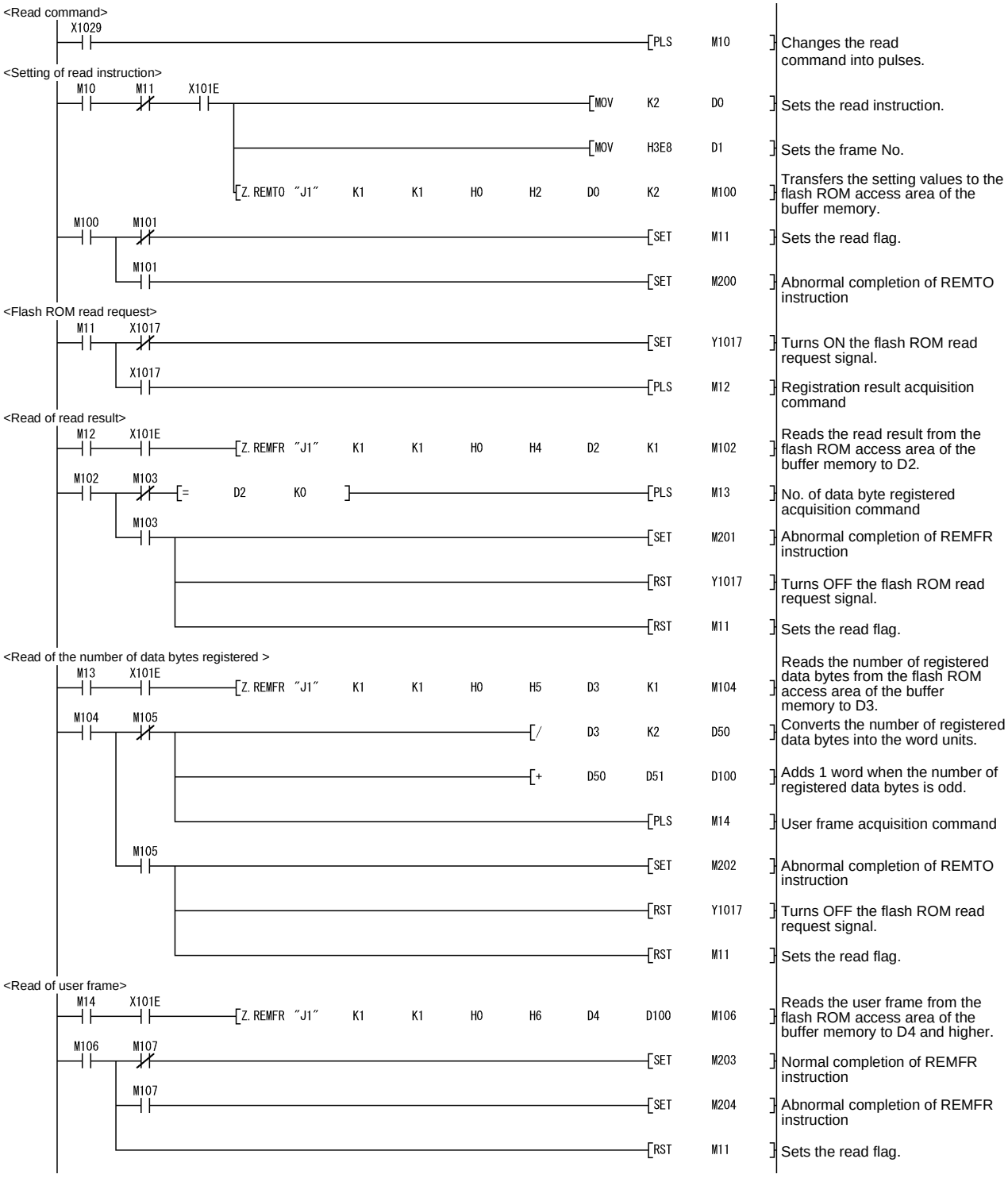
- Read command X1029
- Read command pulse signal M10
- Read flag M11
- Registration result acquisition command M12
- Number of data byte registered acquisition command M13
- User frame acquisition command M14
- Completion device for REMFR/REMTO instruction ..... M100 to 107
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 204
- Read instruction D0
- Frame No. D1
- Read result D2
- Number of data bytes registered D3
- User frame ..... D4 or later
- Number of registered data D50, D100

(b) Buffer memory settings used in this example

These settings are used to read the user frame registered in Appendix 9.9.

Address Decimal (Hexadecimal) CH1	Name		Setting value
2 (2H)	For flash ROM access	Register/read/delete instructions	2
3 (3H)		Frame No. direction	03E8H
4 (4H)		Registration/read/delete result storage	—
5 (5H)		Number of data bytes registered designation	10
6 (6H)		User frame	3946H
7 (7H)			3030H
8 (8H)			3030H
9 (9H)			4646H
10 (AH)			3030H

(2) Program example



Appendix 9.11 When deleting user frame

The following program example deletes a user frame registered to the flash ROM of the Q series C24 using the REMFR/REMTO instruction and I/O signals.
Refer to Section 9.4 of the User's Manual (Application) for details.

POINT
It is recommended to use GX Configurator-SC when deleting a user frame registered to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program deletes a user frame registered to the flash ROM of the QJ71C24N when the delete command (X1030) turns ON.

(a) Devices used:

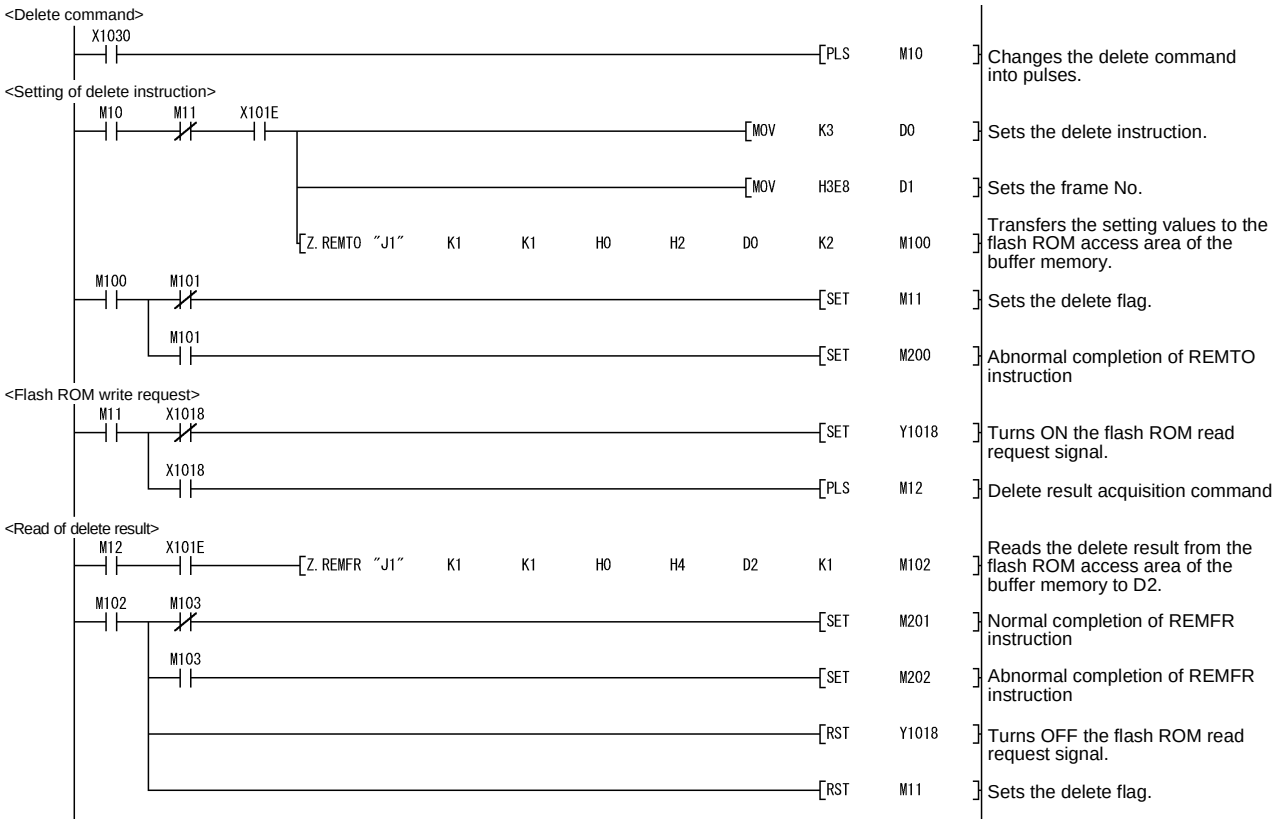
- Delete command X1030
- Delete command pulse signal M10
- Delete flag M11
- Delete result acquisition command M12
- Completion device for REMFR/REMTO instruction ..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 202
- Delete instruction D0
- Frame No. D1
- Delete result D2

(b) Buffer memory settings used in this example

These settings assume that the user frame registered in Appendix 9.9 is deleted.

Address Decimal (Hexadecimal) CH1	Name		Setting value
2 (2H)	For flash ROM access	Register/read/delete instructions	3
3 (3H)		Frame No. direction	03E8H
4 (4H)		Registration/read/delete result storage	—

(2) Program examples



Appendix 9.12 When changing the communication protocol and transmission setting

This section provides a program example that changes the communication protocol and transmission setting using the REMFR/REMTO instructions and I/O signals.
(When the module is used on a MELSECNET/H remote I/O station, the station No. cannot be changed because the UINI instruction is unavailable.)
For changing the communication protocol and transmission setting, refer to Chapter 15 of the User's Manual (Application).

(1) Program conditions

When the change command (X1031) turns on, the communication protocol and transmission setting are changed.

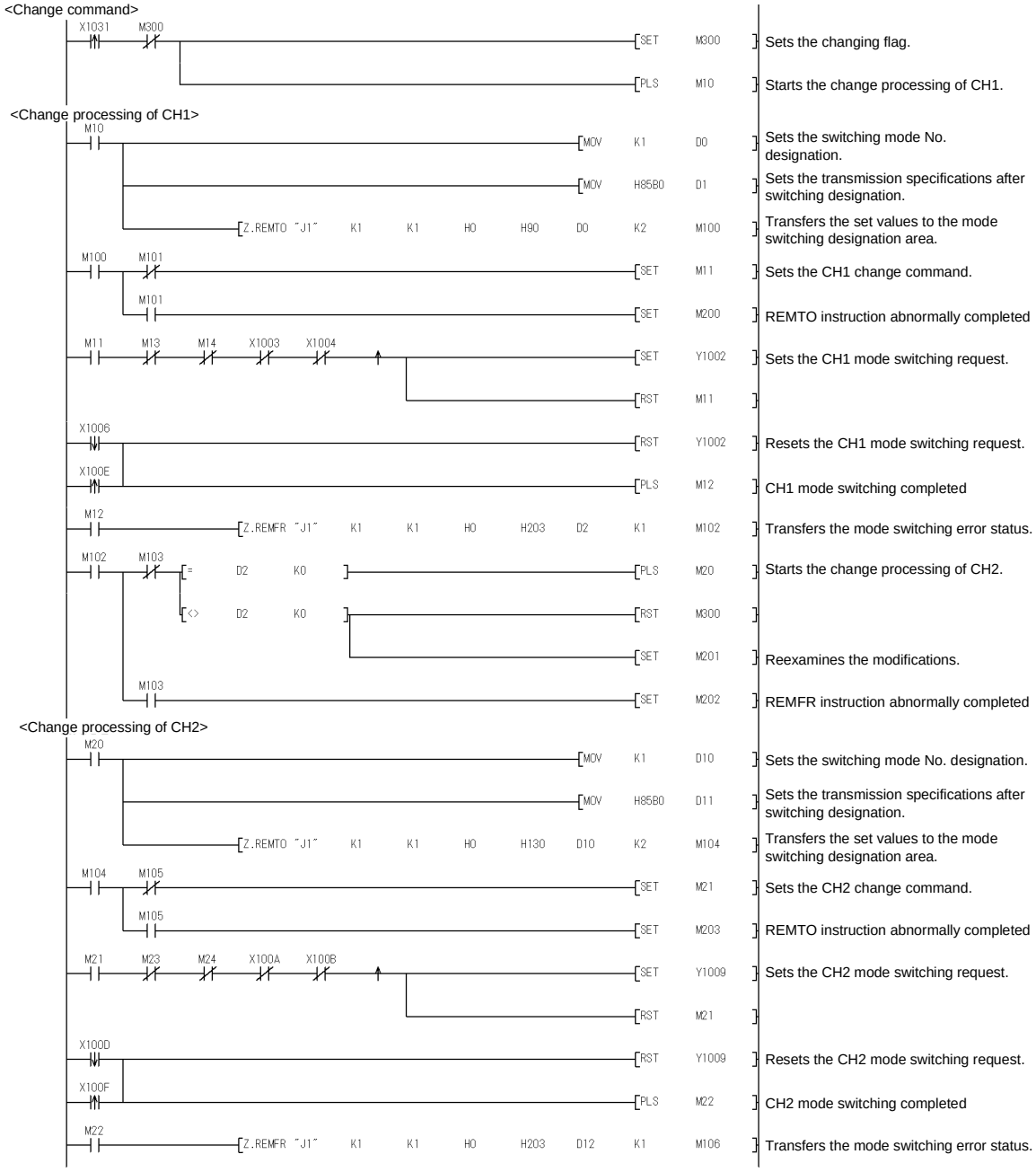
(a) Devices used by user

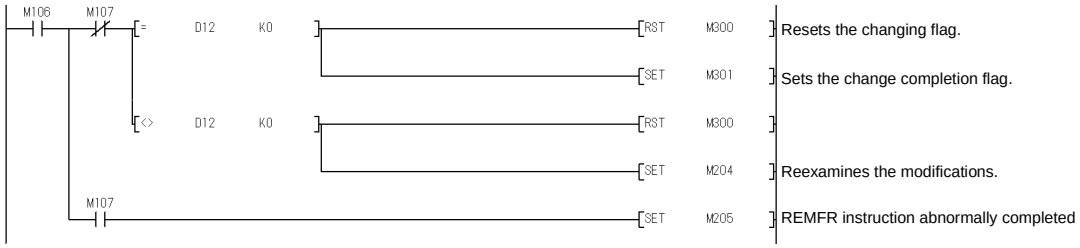
- Change command X1031
- Changing flag M300
- Change completion flag M301
- CH1 change command pulse signal M10
- CH1 change command M11
- CH1 mode switching completion M12
- CH1 receive processing M13
- CH1 send processing M14
- CH2 change command pulse signal M20
- CH2 change command M21
- CH2 mode switching completion M22
- CH2 receive processing M23
- CH2 send processing M24
- REMFR/REMTO instruction completion device ..... M100 to 107
- REMFR/REMTO instruction abnormal completion flag ..... M200 to 205
- Switching mode No. designation D0, D10
- Transmission specifications after switching designation D1, D11
- Switch setting error and mode switching error status D2, D12

(b) Buffer memory settings used in this example

<table>
<tr><th colspan="2">Address, Decimal (Hexadecimal)</th><th colspan="2">Bit</th><th colspan="3" rowspan="2">Description</th><th rowspan="2">Set value</th></tr>
<tr><th>CH1</th><th>CH2</th><th>Position</th><th>Specified value</th></tr>
<tr><td>114 (90H)</td><td>304 (130H)</td><td colspan="2">—</td><td colspan="2">Switching mode No. designation</td><td>MC protocol (Format 1)</td><td>0001H</td></tr>
<tr><td rowspan="11">145 (91 H)</td><td rowspan="11">305 (131H)</td><td>b0</td><td>OFF</td><td rowspan="11">Transmission specifications after switching designation</td><td>Operation setting</td><td>Independent</td><td rowspan="11">85B0H</td></tr>
<tr><td>b1</td><td>OFF</td><td>Data bit</td><td>7 bits</td></tr>
<tr><td>b2</td><td>OFF</td><td>Parity bit</td><td>No</td></tr>
<tr><td>b3</td><td>OFF</td><td>Even/odd parity</td><td>Odd</td></tr>
<tr><td>b4</td><td>ON</td><td>Stop bit</td><td>2 bits</td></tr>
<tr><td>b5</td><td>ON</td><td>Sum check code</td><td>Yes</td></tr>
<tr><td>b6</td><td>OFF</td><td>Write during RUN</td><td>Prohibited</td></tr>
<tr><td>b7</td><td>ON</td><td>Setting modifications</td><td>Allowed</td></tr>
<tr><td>b8 to b11</td><td>—</td><td>Communication rate setting</td><td>9600bps</td></tr>
<tr><td>B12 to 14</td><td>All OFF</td><td>For system</td><td>—</td></tr>
<tr><td>B15</td><td>ON</td><td>Transmission specifications after switching designation</td><td>Make setting as set in this area.</td></tr>
<tr><td colspan="2">515 (203H)</td><td colspan="2">—</td><td colspan="3">Switch setting error and mode switching error status</td><td>—</td></tr>
</table>

(2) Program examples




M106
M107
=
D12
K0
RST
M300
Resets the changing flag.
SET
M301
Sets the change completion flag.
<>
D12
K0
RST
M300
SET
M204
Reexamines the modifications.
M107
SET
M205
REMFR instruction abnormally completed

Appendix 10 Setting Value Recording Sheet

The following sheet is for recording parameter setting values set by GX Developer. Use as many copies as needed.

* In order to review the setting values of the utility package (GX Configurator-SC), print out the content of the file generated by the "Make text file" function of GX Configurator-SC which can be used as the setting value recording sheet.

[Module No.]

Recording sheet 1 (Intelligent function module interrupt pointer setting)

GX Developer setting screen	Data item name		Set data	
			Setting value	Remarks
Intelligent function module interrupt pointer setting	CPU side	Interrupt pointer start No.		Input format: Decimal
		Interrupt pointer No. of modules	2 (fixed)	
	Intelligent module side	Start I/O number		Input format: Hexadecimal
		Start SI number	0 (fixed)	Input format: Decimal

Recording sheet 2 (Remote password setting)

GX Developer setting screen	Data item name		Set data	
			Setting value	Remarks
Remote password settings	Password settings	Password		Input format: Character strings
	Password active module settings	Model name	QJ71C24/CMO	Input format: Selection
		Start XY		Input format: Hexadecimal

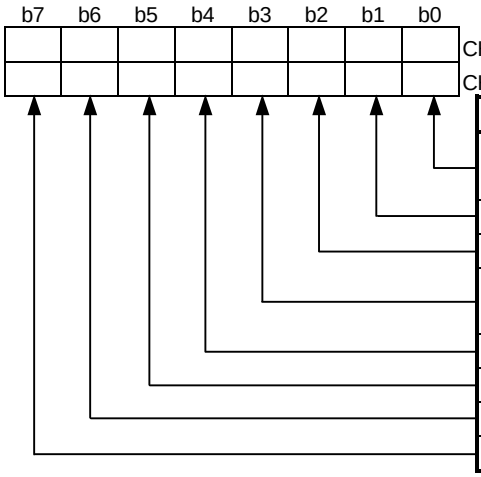
Recording sheet 3 (Intelligent function module switch setting)

Switch number	Description															
Switch 1	CH1 Communication rate setting								CH1 Transmission setting							
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	H															
Switch 2	CH1 Communication protocol setting =															
Switch 3	CH2 Communication rate setting								CH2 Transmission setting							
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	H															
Switch 4	CH2 Communication protocol setting =															
Switch 5	Station number setting =															

* Check the setting values in the next page and record them.

(GX Developer "Intelligent function module switch setting" setting values recording check sheet)

(1) Transmission setting (Enter "0" or "1" in the bit position field)



Bit	Description	OFF (0)	ON (1)	Remarks
b0	Operation setting	Independent	Linked	Always set to OFF on CH1 side.
b1	Data bit	7	8	Do not include parity bit.
b2	Parity bit	No	Yes	Vertical parity
b3	Odd/even parity	Odd	Even	Valid only when parity bit is set to Yes.
b4	Stop bit	1	2	—
b5	Sum check code	No	Yes	—
b6	Write during RUN	Prohibit	Allow	—
b7	Setting modification	Prohibit	Allow	—

(2) Communication rate setting (Enter check marks in the CH1 and CH2 fields)

CH1	CH2	Setting value	Communication speed (unit: bps)
		F_H	50
		0_H	300
		1_H	600
		2_H	1200
		3_H	2400
		4_H	4800
		5_H	9600
		6_H	14400
		7_H	19200
		8_H	28800
		9_H	38400
		A_H	57600
		B_H	115200
	—	C_H	230400

(3) Communication protocol setting (Enter check marks in the CH1 and CH2 fields)

CH1	CH2	Setting value	Setting data	
		0_H	GX Developer connection	
		1_H	MC protocol	Format 1
		2_H		Format 2
		3_H		Format 3
		4_H		Format 4
		5_H		Format 5
		6_H	Non procedure protocol	
		7_H	Bidirectional protocol	
		8_H	For linked operation setting	
		9_H to D_H	Setting prohibited	
		E_H	ROM/RAM/Switch test	
		F_H	Individual station recovery test	

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WARRANTY

Please confirm the following product warranty details before using this product.

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If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
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In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable logic controller range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

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